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Legislative Assembly of Ontario

Select Committee on Energy
Organization



Second Session, 34th Parliament
Monday 31 July 1989

Speaker: Honourable Hugh A. Edighoffer
Clerk of the House: Claude L. DesRosiers

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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Monday 31 July 1989

The committee met at 1423 in committee room 1.

ORGANIZATION

The Chairman: I call this meeting of the select committee to order. To begin, let me introduce those with me at the table. To my right is Deborah Deller, who is going to be acting as the clerk of the committee during these sessions. To my left is Lewis Yeager, who is going to be our researcher. Jerry Richmond, who is to his left, will be helping out. To Jerry's left and slightly around the corner is Vic Nishi, who is an intern with the research department and is going to be adding his able assistance to our deliberations.

We have a few housekeeping measures to deal with. The first is the election of a vice-chairman, so I will open the floor to nominations for vice-chairman.

Mrs Sullivan: I would like to nominate Jim McGuigan as vice-chairman of the committee.

The Chairman: Seconded and thirded, I notice. Are there any other nominations? Mr Jackson moves that nominations be closed. All in favour? Opposed?

Motion agreed to.

The Chairman: Congratulations, Mr McGuigan.

The next piece of business is the budget. There has been a copy of a proposed budget circulated. Could we turn to that? This is based on the budget for the last select committee. I wonder if there are any questions. This has been looked at by the subcommittee, which of course is yet to be created but did meet. The witness fees and expenses for those on the subcommittee, you will notice, have been set at \$5,000 to deal with any witnesses who do wish to come in from out of Toronto and any expenses we may choose to give them to assist them.

Are there any questions on this budget? Seeing none, Mr Jackson has moved its adoption. All those in favour? Opposed?

Motion agreed to.

The Chairman: We will put that before the Board of Internal Economy at its next meeting and get the final approval.

Our next head of business is the business subcommittee. Could I have a motion regarding that subcommittee?

Mrs Sullivan moves that Messrs Charlton, Cureatz, Carrothers and Mrs Sullivan compose the business subcommittee; that the said business subcommittee meet from time to time at the call of the chairman to consider and report to the committee the business of the committee; that substitution be permitted on the business subcommittee, and that the presence of all members of the business subcommittee is necessary to constitute a meeting.

Motion agreed to.

The Chairman: Mr Jackson moves that unless otherwise ordered, a transcript of all committee hearings be made. Any discussion?

Motion agreed to.

The Chairman: The next piece of business is witnesses. We are going to be holding our hearings the last week of September and the first week of October. The select committee on energy will be advertising, and I propose that the committee speak to the Speaker and get permission to advertise as early as possible. I am not quite sure when the next Board of Internal Economy meeting is, so we may want to just get some permission. I will go ahead and do that.

I propose that we advertise in all of the major dailies. Is there any discussion or comment on that? That essentially is what the select committee did the last time around.

Mrs Sullivan: If you want a response for the record, I think that is appropriate and indeed that is what the unconstituted subcommittee had thought was the appropriate method of proceeding.

The Chairman: Fair enough. I will move to do that as quickly as we can then. I also think it would be appropriate if the committee wrote to those organizations that we may well want to speak to us, just to make sure that they do indeed know we are there and therefore could use a list of witnesses. I note that there is a list that the Ministry of Energy has made available.

Mr Charlton: I was just going through precisely that question myself, both with the list from our hearings last year and the list of witnesses before the 1986 committee. My

personal opinion is that the easiest way to handle it and avoid any potential criticism would be to mail a notice of the hearings to all the participants in last year's and the 1986 hearings.

Basically, I suggest that because there are some who appeared last year who will be interested in the topic before us this year and, in fact, a larger number who appeared in 1986 who will be interested in this topic of regulation and control of Ontario Hydro.

Just quickly looking through the list, I can remember the major ones who made presentations on amendments to legislation and regulation of Hydro, but there are a number of minor participants; I cannot specifically remember what their presentation was about. I think we are safer just to mail the notice to all of them and those who are interested in the topic will appear.

In the 1986 hearings, some came on the questions of regulation and amendments to legislation. Others came on questions of demand/supply options, conservation and other issues and will not be interested in these particular hearings. But if we mail to them all, I think we are safe and that provides us with two ready lists.

The Chairman: The proposal is to mail to all witnesses who came before the 1986 and 1988 select committees. Is there any other comment? I notice a lot of nodding.

1430

Mrs Sullivan: I think that is a responsible way to proceed. I am just wondering if there would be other groups that perhaps our research people could assist in identifying that may have grown up since the 1986 hearings or that may not have been particularly interested in appearing before the committee last year because the topic was quite different. Sometimes there are spontaneous organizations that come to the fore, and they might be interesting to us.

The Chairman: Research, do you have any comment on that? Are there any groups you can think of?

Mr Yeager: None come specifically to mind, but we can go through recent news clippings at the library and solicit from other members of the committee. We can find anybody like that quite quickly.

The Chairman: I think the starting list would be those witness lists from the last two committees.

Mr Charlton: Certainly if they come up with a couple of groups that have come into existence, I have no problem with that at all.

The Chairman: All right, if we go from the 1986 and 1988 select committee witness lists, plus the five that the ministry sent us, which I think were at both those anyway, and leave to the discretion of the chair any additions, the chairman will not get cut off at the knees, will he?

Mr McGuigan: I wonder if public relations at Ontario Hydro have a list of people who write in from time to time.

The Chairman: Could you move forward, closer to the microphone? I guess they were not picking you up. You mentioned public relations at Hydro. What does the committee feel about contacting that organization and asking if it has any suggestions?

Mr Charlton: I have no problem with that either. I can tell you what you will get from them but I have no problem with contacting them, because they may have one or two that I am not aware of.

The Chairman: I think we have a contact from the last set of hearings. Maybe research could give them a call. All right. Research is also suggesting it should touch base with the ministry. It can do that as well.

Mr Matrundola: Obviously you are going to advertise it in the newspapers as has been done in the past.

The Chairman: Yes, all the major dailies, as we decided a few minutes ago.

Mr Matrundola: Very well.

The Chairman: The copy of the ad is in that package. There is a paper in the file that you all have in front of you which is a proposed ad, if we could turn to that. It is the one with the bold heading, "Bill 204, An Act to amend the Power Corporation Act." It would be in the file folder. Have you all found your copy? There is also a letter. Should I read it out then? The proposed text is:

"The select committee on energy will meet to consider Bill 204, An Act to amend the Power Corporation Act, commencing Monday 25 September 1989 in the Legislative Building, Queen's Park, Toronto, Ontario. The committee invites written submissions from individuals, groups or organizations wishing to comment on the above-mentioned bill. All briefs should be deposited with the clerk of the committee no later than Friday 29 September 1989. Requests for appointments to appear before the committee to make an oral presentation should be directed to the clerk of the committee not later than Friday 15 September 1989 for the consideration of the

committee." Then it has the signature of the chairman and the clerk.

Does that wording sound appropriate? We are directing that briefs can be submitted until 29 September, which would be the end of the first week of our hearings, and we are making it clear that appointments to appear before the committee have to be in before 15 September. I think this is tending to be the format that is used. Are there any comments?

Mrs Sullivan: It sounds just fine.

The Chairman: All right. Shall I take that as approval?

The other document is a draft letter, which I think most of you have. It is the letter that is proposed to be sent to the list which we just spoke of. Are there any comments on that letter? It is very nicely typed and all that.

Mr Jackson: Looks good. I was very impressed.

The Chairman: My compliments to the typist. Any other comments on the letter? All right. I will take that as approved as well.

Just to summarize, we will use the 1986 and 1988 witness lists. Research will talk to Hydro, the ministry and anybody else it can think of and see if there are any names that should be added.

Mr Charlton: While we are still on the question of names and sending out letters, Jerry and I just had a quick chat and it probably makes sense—and Jerry can probably pull this together for the clerk fairly quickly. There were some presentations before the select committee which were from expert witnesses who were brought in specifically for the purpose of testimony on the regulatory process in their particular jurisdiction or changes they had just made and so on and so forth.

It might be useful if we very quickly identified who those people were and perhaps sent something a little more specific to them asking for any updates on how things have gone since 1986, any changes they are now contemplating as a result of their experience over the past three or four things, that kind of thing, just an update.

The Chairman: I would just strike a note of caution. Many of those witnesses were in fact hired by the committee and paid fees to do that. I would be hesitant to write such a letter because you might be committing the committee to pay fees for the update.

Mr Charlton: I am not suggesting that you do that or that it will necessarily happen in any case. If somebody does not want to respond to a letter we send him unless we send money, then that is

something you come before the committee with and the committee will likely say no.

I am just suggesting that we had major presentations from a number of jurisdictions and if there are things they reported to us in 1986 that did not work, for example, we would like to know about them. If we ask for an update and do not get it, that is fine.

The Chairman: Having had that business relationship, though, I would be hesitant that they might assume a fee is involved. Is there any other discussion?

Mr McGuigan: I think if you are going to do that, you should point that out.

The Chairman: All right.

Mrs Sullivan: How many consultants would there have been in that?

The Chairman: We had about 10 to 12, I think, all told. There were quite a few on the last select committee. Because of the nature of it we had actually—

Mr Charlton: More specifically on the question that I have just raised with you, there were only about—

Mrs Sullivan: Were you not talking about the 1986 consultants?

Mr Charlton: Yes, not the consultants to the committee. They were experts who were brought in for a specific purpose. There were about four who were brought in on questions of regulatory structure, how they regulated their utility, which is the question we are looking at. We are only talking about probably four letters in addition to the ones we have already agreed to.

The Chairman: Maybe those could be identified and we will make the appropriate amendments to the letter to make it clear and specifically ask them to update, just making sure, though, that we know what financial obligations are entailed.

Mr Charlton: Fine.

The Chairman: Okay, are there any more comments in terms of the witnesses and how we should go about letting them know? If not, then I will—

Mr Matrundola: How long are the witnesses going to talk for, or are we not on that item?

The Chairman: That is the next heading of business, so we will get on to that in just one second. I will take it then that I will proceed as we have just discussed in terms of soliciting witnesses and putting the notices in the paper.

As Mr Matrundola has pointed out, the next issue, for the benefit of the clerk, is perhaps some

discussion as to the allotment of time each witness is going to get. I think there is about a 30-minute slot usually given on committees now. Should we use that as our working time frame for each witness?

Mr Matrundola: I suggest 30 minutes per witness is probably too long. It should be reduced because it would allow us to hear from more witnesses.

The Chairman: I wonder if we do not want to see how many witnesses we have before we start reducing times.

Mr Matrundola: Perhaps it might be a good idea.

The Chairman: Half an hour would give time for a 15-minute presentation and 15 minutes of discussion, which is not a lot. I would be hesitant to shave it unless we had to.

Mr Matrundola: You are probably quite right, but if you recall, if you allow them half an hour, they take three quarters of an hour or even longer and it becomes difficult to cut them off.

Mr Charlton: But our chairman is a lot more seasoned now.

The Chairman: I could get a bigger gavel.

Mrs Sullivan: If I could just speak to that, it seems to me that for people who are coming as interveners and responding to the act as witnesses, half an hour is appropriate. There are some witnesses, however, for whom I think we are going to require a longer time, including Ontario Hydro. Clearly we have already allowed for longer time for the ministry in our hearings tomorrow. If we decide to call the Ontario Energy Board for responses, it might possibly want to have a longer time period as well. If that could be built into a schedule—

Mr Charlton: Just on that as well, something that you can think about that I would certainly have no problem with, and I do not think anybody else on the committee will, is that the kinds of groups, for example, that you are going to see interested in this kind of stuff are groups like the Independent Power Producers' Society of Ontario.

What you are going to get is the society wanting to come before us and a number of individual independent power producers as well. We could perhaps set aside a slightly larger time slot for the society and put rather severe limits on the individual members of the society who want to add themselves to the list to give you some additional information that affects their particular situation, or whatever.

The Chairman: In quantifying that, 45 minutes or an hour for the groups? What would you think would be appropriate?

Mr Charlton: Perhaps you would want to give the society 45 minutes instead of half an hour, or maybe limit it to the half-hour but allow for an extra 20 minutes for four additional members of the society to deal with some specifics; in other words, five minutes apiece or something.

Mrs Sullivan: Could we leave that kind of scheduling detail to the business subcommittee?

Mr Jackson: Yes, that would be the best idea.

Mr Charlton: Yes, I am just suggesting that that is an—

The Chairman: Yes, we could sort of ask around. If questions are raised—

Mr Charlton: All presentations do not have to be identical. There are reasons to limit some if you have already had a major overall presentation.

Mr McGuigan: It is called flexibility.

The Chairman: I am nothing if not flexible, Mr McGuigan.

Clerk of the Committee: Could I just suggest that I use 30 minutes as a guide? Where people indicate that they need more time or where it is a group that probably looks as if it will need more time, I will draw that to the attention of the chairman and/or the business subcommittee and we can expand time where needed.

The Chairman: Why don't we plan to hold a meeting of the subcommittee in early September and it can look at these details? I am sure we will know them by then and we could then go with the 30-minute basic slot and adjust up or down accordingly. I would propose, if discussion gets going, and I do not think our time frame is going to be that jammed up, we might, shall we say, get a little flexible if that discussion was fruitful.

All right, that completes the formal agenda. Are there any other items that anyone would like to bring up at this time?

Mr Charlton: It might be helpful if we could ask research just to pull from the 1986 documents which were submitted to the committee those documents that related to questions of the Power Corporation Act, the Ontario Energy Board Act and, in general, the accountability and regulation of Ontario Hydro. If you could provide copies of those to members of the committee for bedtime reading between now and the commencement of hearings, I think it would give a lot of valuable background to the members of the committee.

That would include any presentations which Hydro made.

The Chairman: Any comment? I see more or less nodding, so if research could do that, that would be helpful.

Any further comments or anything that anybody would like to raise at this point? Tomorrow we will be meeting for a briefing on this from the Minister of Energy (Mr Wong). We have set aside the whole day. I guess we will just see what time frame we really do take in order to go through this bill.

Mr Matrundola: I would appreciate very much if we can establish when we will be sitting for the full days in the evenings, to know a time when we are going to leave. That will enable us to make our proper commitments in the ridings and otherwise, rather than leave it completely open. We could establish at what time we will—

The Chairman: We will have to do that more formally for the fall sessions when we see our own agenda. I would anticipate that tomorrow, if we have an afternoon session, we would be through by four o'clock. I do not think we have quite the same load of work before us as we did as the select committee, so I do not anticipate sitting until seven and eight o'clock the way we ended up doing.

Mr Matrundola: Very well. Thank you kindly.

The Chairman: If there are no further comments, I will adjourn the committee until 10 o'clock tomorrow morning in this committee room.

The committee adjourned at 1444.

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SELECT COMMITTEE ON ENERGY

Chairman: Carrothers, Douglas A. (Oakville South L)**Vice-Chairman:** McGuigan, James F. (Essex-Kent L)

Brown, Michael A. (Algoma-Manitoulin L)

Charlton, Brian A. (Hamilton Mountain NDP)

Cureatz, Sam L. (Durham East PC)

Grier, Ruth A. (Etobicoke-Lakeshore NDP)

Matrundola, Gino (Willowdale L)

Ray, Michael C. (Windsor-Walkerville L)

Runciman, Robert W. (Leeds-Grenville PC)

South, Larry (Frontenac-Addington L)

Sullivan, Barbara (Halton Centre L)

Substitution:

Jackson, Cameron (Burlington South PC) for Mr Runciman

Clerk: Deller, Deborah**Staff:**

Yeager, Lewis, Research Officer, Legislative Research Service

Richmond, Jerry M., Research Officer, Legislative Research Service



Hansard

Official Report of Debates

Legislative Assembly of Ontario



Select Committee on Energy

Power Corporation Amendment Act, 1989

Second Session, 34th Parliament

Tuesday 1 August 1989

Speaker: Honourable Hugh A. Edighoffer

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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Tuesday 1 August 1989

The committee met at 1014 in committee room

1.

POWER CORPORATION AMENDMENT ACT, 1989

Consideration of Bill 204, An Act to amend the Power Corporation Act.

The Chairman: I call this meeting of the select committee on energy to order, please. Is everyone seated?

This morning, we are going to receive a briefing from the Ministry of Energy on Bill 204. We have before us the Minister of Energy, the Honourable Bob Wong. Welcome. Perhaps I could ask you to introduce those who are at the table with you and I will then turn the floor over to you for the presentation.

MINISTRY OF ENERGY

Hon Mr Wong: Seated to my immediate right is Jean Lam, executive co-ordinator, liaison and planning branch, for the Ministry of Energy. To her right is Andy Frame, senior adviser, utilities and operation, electricity section. To my left is Ed Ciemiega, director of legal services. Later, Jean Lam and Andy Frame will make the presentation.

Let me begin by giving you a brief address on where I see things and by reminding this committee that the objective of the amendments we are discussing today, that of making Ontario Hydro more responsive to government policy and public priorities, is not a new one. It has been a priority of this government and my ministry from the start, and a great deal of progress has already been made in this direction.

For example, we have conducted reviews of Hydro's planning principles as set out in its draft demand/supply strategy. Three such reviews have already been carried out, one by a dozen government ministries, one by an independent technical advisory panel and one by the select committee on energy.

Hydro will now take the results of these reviews into account as it develops its detailed plans for submission to the government in the fall, and these plans will be subject to still further review. It is the first time Hydro's planning has been opened up to public scrutiny in this way.

We also initiated independent reviews of Candu nuclear costs and the whole question of nuclear safety. Both reports have been released publicly, as this committee knows.

You will also remember that I was not ready to accept Hydro's energy efficiency and parallel generation targets for the year 2000. Hydro was looking to 5,500 megawatts. I thought they could do better and I encouraged them to do so.

Quite clearly, a fundamental and very positive shift has occurred in the relationship between Ontario Hydro and the government. What we must do now is give this process added impetus, and that, ladies and gentlemen, is what our legislative package is designed to achieve. I will go over the major changes very briefly and then my staff, as I indicated before, will provide a more detailed review.

To begin with, the package gives the government authority to issue policy statements on matters relating to Hydro's exercise of its duties, statements which Hydro is obliged to respect. The amendments also empower the government to obtain Hydro plans and reports for review.

You will note that the memorandum of understanding goes well beyond previous memoranda between Hydro and the government. It sets out a new system of consulting and reporting that gives the government early access to Hydro's planning information, leaving time for review and comment.

A key feature of the new system is the Hydro committee which, as you know, is chaired by the Premier (Mr Peterson) and contains a number of ministers. The committee is there to make sure that Hydro is aware of and responds to the full range of government concerns and priorities.

Two vitally important issues are demand management, including energy efficiency and conservation, and parallel generation. The legislative package addresses both issues by removing legislative barriers and giving Hydro the freedom to provide incentives for initiatives in these areas.

Hydro must also ensure that its programs are developed in a manner compatible with the government's environmental goals, including goals for improving air and water quality through reduced emissions. In addition, it must provide the Minister of Energy and the Minister of the

Environment (Mr Bradley) with reports on its initiatives and targets for environmental protection.

The overall effect of these changes is to create a vital new working relationship between Ontario Hydro and the government. It is a relationship that will allow the government to play an active, ongoing role in assessing goals for energy efficiency and parallel generation and evaluating Hydro's plans for meeting these goals.

This legislative package, while not yet law, has already sent a clear signal to Hydro of the government's expectations, and Hydro has been reading the signal. There is a new and growing mood of responsiveness at the utility, a new and growing readiness to meet the concerns of the Ontario public and to further the broad economic, social and environmental objectives of the Ontario government.

1020

In January, for example, I announced the construction of an 87-megawatt cogeneration facility on the grounds of the Boise Cascade pulp and paper mill in Fort Frances. The project, which will cost \$100 million, involves using a natural-gas-fuelled turbine to produce steam for the company's boilers and electricity for Ontario Hydro.

Then, in March, Hydro responded to a key government priority for remote northern communities. It lowered the rates paid for electricity in these communities to the levels paid in other rural areas. At the same time, Hydro will be improving the infrastructure and running lines into communities that are not yet supplied with electricity.

Here, Hydro was not acting simply as an electric utility. It was meeting its obligation to provide electricity and at the same time it was making an important contribution to the general economic wellbeing of the northern region.

As another example of the new responsiveness, Hydro is now reviewing its procedures for declaring surplus lands. The review is being conducted in consultation with three ministries that have a stake in the issue: the Ministry of Housing, the Ministry of Government Services and the Ministry of Energy.

The new relationship has also been very much in evidence in dealings between Hydro and the government on parallel generation. Members of this committee may remember that Hydro originally set itself a goal of 300 megawatts of additional capacity by the year 2000. I believed that more could be accomplished, and a year ago last spring, Hydro accepted a new target of 1,000 megawatts of additional capacity.

Now that target has been raised. The new policy on parallel generation, which I introduced in this House earlier this month, directed Hydro to advance its 1,000-megawatt target by five years to the year 1995. For the year 2000, the government has set a target that is now 2,000 megawatts above today's parallel generation capacity.

Hydro has also responded positively to the matter of acid gas emissions. In January, right on schedule, it submitted a plan that contains a commitment to meet, or better, provincial targets for reducing air pollution by the year 2000. The plan calls for cutting acid gas emissions by 60 per cent during the period from 1982 to 1994. It is a huge commitment because the production of electricity is itself expected to increase over that 12-year period by the same proportion, about 60 per cent.

All of these developments point to a growing responsiveness on the part of Ontario Hydro to the policies of the government and the priorities of the public. The purpose of the amendments and the memorandum of understanding which we are considering today is to formalize and to reinforce the new relationship.

One of the government's next steps will be to review the Ontario Energy Board Act, which deals with the mechanisms for setting wholesale electricity rates and rate review processes. Any adjustments to the current process will be considered during that review and will be looked at in the context of the new relationship that this legislative package creates.

In closing, I would like to say that under the amended act and the new memorandum of understanding, Hydro will continue to operate according to sound commercial principles. The changes acknowledge the areas in which Hydro excels and they do not impinge on its day-to-day operations.

At the same time, Hydro is a public utility and our legislative package reflects the government's responsibility to ensure that Hydro's activities serve the public interest. It provides the government with the authority and the means to ensure that Hydro is working within a policy framework which reflects government objectives and public concerns.

This government has made a commitment to bring its relationship with Hydro into the next century. It undertook to position this very large and important utility to respond more effectively to current realities and to new and evolving government objectives and public concerns. The legislative proposals which you have before you

today provide the means of carrying that undertaking forward. I can assure you that we will be monitoring the relationship as it continues to evolve and we will be prepared to introduce any further amendments that may be necessary.

The Chairman: Thank you, Minister. I am wondering how we want to proceed. You have a more detailed presentation from your staff. Is that right?

Hon Mr Wong: Yes, I would take direction from you if it would be more efficient.

The Chairman: Perhaps it would be useful to just proceed to that.

Mr Charlton: I would recommend that we see the entire presentation so that we do not start asking questions that are going to be answered in the presentation—

The Chairman: And run the risk of getting off the track.

Mr Charlton: —and try to limit ourselves to asking questions that have not been addressed when the presentation is finished.

The Chairman: All right. So why do we not proceed through the full ministry presentation, and then we will have questions from the committee after that. I notice the coffee has arrived, if any of the members would perhaps like some.

Could we perhaps dim the lights a bit? Is that easily visible to everyone?

Mr Charlton: It should be noted, Mr Chairman, that it was Hydro that adjusted the lights.

[Slide presentation]

Ms Lam: As part of the government's plan to ensure that Ontario Hydro is responsive to the priorities and needs of the people of Ontario, an extensive review of the Power Corporation Act was undertaken. The presentation today will outline the changes that have been introduced through amendments to the act and the memorandum of understanding between Ontario Hydro and the Ministry of Energy. I will outline very generally what is in the existing act and the nature of the review of the Power Corporation Act. Andy Frame will provide the details of the nature of the amendments.

In the throne speech of 3 November 1987, the government undertook to: encourage energy conservation; encourage public input in the development of energy policy; foster greater responsiveness to public attitudes and concerns on the part of Ontario Hydro through, among other initiatives, a review of the Power Corporation Act.

The Power Corporation Act defines the responsibilities of Ontario Hydro in meeting the electricity requirements of the people of Ontario. Under the act, responsibility for the business and affairs of the corporation is placed under the control and direction of the board of directors.

The existing Power Corporation Act defines the purposes of the corporation and duties, obligations and powers of the board of directors. It represents the charter of the corporation. It also sets out the relationship between the corporation and the municipal electric utilities.

A significant degree of responsibility to government is already assured by the act, with requirements for approval by the Lieutenant Governor in Council for a number of matters, including the appointment of the chairman and the board of directors, construction of facilities and borrowing.

This review of the Power Corporation Act and the government/Ontario Hydro relationship was designed to examine three things: whether these existing mechanisms are sufficient to ensure responsiveness on the part of Ontario Hydro; whether Ontario Hydro's mandate should be extended to allow it to act as an instrument of government policy, and whether legislative amendments are required to protect Ontario's interest in electricity matters under the free trade agreement.

The amendments to the legislation are intended to help government achieve the objectives for electricity policy as outlined in detail on pages 3 and 4 of the memorandum of understanding. They provide a new foundation for the relationship between the government and Ontario Hydro. This relationship and the information sharing and consultation mechanisms are spelled out in greater detail in the memorandum of understanding.

Andy Frame will now describe in detail the amendments to the Power Corporation Act and the contents of the memorandum of understanding.

Mr Frame: The amendments enable the government to issue policy statements relating to Ontario Hydro matters and require Ontario Hydro to respect these statements in exercising its powers and duties and to make its best effort to ensure that its activities broadly conform to government policy.

1030

The Minister of Energy will be empowered to initiate public inquiries on any matters to which the act applies. The revised act will require Ontario Hydro to submit reports and other

information to the Minister of Energy and the Treasurer of Ontario (Mr R. F. Nixon) as required.

The revised Power Corporation Act requires Ontario Hydro to enter into a memorandum of understanding within six months after the proclamation of subsection 9b(1) and at least once in every three years thereafter. The memorandum of understanding provides a framework for a new relationship between Hydro and government which acknowledges clearly that Hydro is responsible to the government and will carry out its responsibilities in a manner compatible with government policy.

The new memorandum contains the following:

A clear statement that Hydro is accountable to the government;

A clear statement of the government's objectives with respect to electricity policy, including:

The primary objective, which is to ensure that Ontario's consumers are provided with a secure and reliable supply of electricity at the lowest feasible cost over the long term;

Other objectives including conservation and the efficient use of electricity;

Parallel generation;

The protection of the environment;

Responsiveness by Ontario Hydro;

The use of Ontario Hydro to spur economic growth and development;

The promotion of the appropriate involvement of native communities in Hydro affairs.

The MOU has a provision that a strategic plan with specific supporting documentation be made available to the minister by Hydro.

The MOU also has provisions for consultations between Hydro and the government on specific matters which impact on government policy, including:

The economic and regional development implications of Ontario Hydro's activities;

The research and development activities and priorities of Ontario Hydro; the potential and plans for commercialization of technologies developed by Ontario Hydro;

Ontario Hydro's policies and programs for achieving Ontario's environmental goals and objectives.

The MOU also defines the reporting and consultation mechanisms by which the government will be kept apprised of Hydro's plans and activities. These processes include the formation of a committee of senior ministers chaired by the Premier. This committee, which meets quarterly with the chairman and president of Ontario Hydro—page 15, in section 22 of your

memorandum—is to facilitate the exchange of views on matters of mutual concern to the government and Ontario Hydro.

There is a specific commitment by Hydro to report on measures by which customers in remote communities served by Ontario Hydro are provided power rates equivalent to those in the power district.

Another important area included in the MOU is a commitment by Hydro to identify surplus lands and grant the government first right of refusal to dispose of such lands for the government's Housing First policy and similar government initiatives.

As the minister indicated in his statement, Ontario Hydro has already been responsive to government priorities and has taken action in keeping with the spirit of the MOU. These initiatives include the lowering of electricity rates to residential and commercial customers to the same levels as customers in the rural system. The Ministry of Northern Development and Mines and the Ministry of Energy jointly contributed \$2 million to the remote communities electrification program.

A second example is the government's policy on parallel generation, which fulfils a commitment made in the Power Corporation Act and in the MOU to encourage the development of Ontario's parallel generation resources.

A third example is the government's review of Ontario Hydro's acid gas report.

The changes in the act expand Hydro's mandate in three areas: economic development, electricity conservation and parallel generation. Specific provisions in the MOU detail the reporting commitments made by Hydro in these activity areas.

The bill provides the means by which Hydro will be able to contribute to the economic development of the province through participation in the government's economic development programs; this is your new section 21a. The bill authorizes Ontario Hydro to establish or acquire subsidiaries which will allow the people of Ontario to derive greater benefits from Ontario Hydro's general business and operational activities, and its capacity and reputation for research and development.

The government's policy for encouraging electricity conservation and the development of parallel generation are specifically recognized in the bill. Ontario Hydro will be authorized to provide technical and financial assistance to encourage energy conservation and parallel generation. This is subsection 56b(1). The MOU

calls for Hydro to submit plans and targets for electricity conservation and parallel generation to the government. This is on page 11 and 13 of the memorandum.

In addition, the bill responds to the government's examination of the potential impact of the Canada-United States free trade agreement on Ontario's ability to carry out an independent energy policy and to ensure a secure supply of electricity which will provide maximum benefit to the people of Ontario at the lowest feasible cost to the consumer and the environment.

The bill will ensure that the electricity requirements of Ontario consumers and other consumers in Canada will be met by Ontario Hydro on a priority basis. The government must approve any contract for the export of power out of Canada. Ontario Hydro, before making application to the government for export of power, will be required to satisfy the government that the power to be exported is surplus to the requirements of Ontario and other customers in Canada; that the price recovers associated costs; and that the price to be charged will be more than the price charged to customers in Canada for equivalent service.

The Power Corporation Act gives to the Ontario Hydro board of directors the responsibility of running the corporation's business and operations. Although directors, with the exception of the president, are appointed by the Lieutenant Governor in Council, the president is appointed by the board.

The government expects Ontario Hydro to be operated in a responsible and efficient manner by its chairman and board of directors, compatible with its status as one of Canada's largest corporations. The board responsible for this operation must have a degree of freedom and flexibility commensurate with its responsibilities.

To increase the effectiveness of the board, changes are being made in its makeup and operations. These changes are outlined in subsection 2(1), on page 2 of the bill. The overall objective is increased effectiveness of the Ontario Hydro board of directors. Measures such as one which would allow an increase in the number of directors from 13 to 17 ensure a wider representation of the public interest.

Other legislative changes are being made for specific reasons or to overcome present operating difficulties. One such change is the operation of the electrical safety code of Ontario. The amendments will allow Hydro more latitude in

fulfilling the important function of regulating electrical safety.

Besides making its own regulations on safety, Hydro will be able to adopt, by reference, the requirements of other authorities, for example, the Ontario Building Code. We are at the same time updating the penalty for hindering the work of electrical inspectors and the penalty for noncompliance with safety regulations.

Under the heading of housekeeping matters are such changes as the rewording of various sections of the act to conform with other legislation and the modification or elimination of unnecessary sections.

In summary, the amendments to the Power Corporation Act and the memorandum of understanding will encourage a closer working relationship between Ontario Hydro and the government. This package establishes new mechanisms for information sharing, reporting and close consultation which provides the government with the means to ensure that Hydro is responsive to the government's priorities.

The Chairman: Thank you. Does that complete your presentation?

Hon Mr Wong: Yes, it does.

The Chairman: Are there questions or comments from the committee?

Mr Charlton: Perhaps I can start out by making a few comments that will put my questions in context and, at least from my perspective, set a tone for what we are interested in accomplishing during the course of these hearings on the bill.

1040

I think the minister is aware, from both my comments and the comments of the critic for the Conservative Party during the second reading debate on the amendments, that we support the direction set out in Bill 204 for the changes to the Power Corporation Act and the specific relationship between government and Ontario Hydro.

On the other hand, we are not at this stage convinced that the Power Corporation Act amendments by themselves will accomplish all that even he has set out here for us today in the context of encouraging greater public input into the development of energy policy. We see nothing in the amendments to the Power Corporation Act which fosters that or establishes a mechanism for that to happen.

In the same vein, to foster greater Ontario Hydro responsiveness to government and to public attitudes and concerns, we can certainly see how the amendments to the Power Corpora-

tion Act deal with the first half of that, which are the government priorities and concerns. We still do not see in the amendments to the Power Corporation Act the mechanisms to allow for either the input of public attitudes or to measure the responsiveness to public attitudes.

To be more specific, if I could, there are two things that have to be accomplished in terms of some of the goals that have been set out by the minister and the ministry in these legislative amendments. The goals I think are reflected by the changes in the act to Hydro's mandate, the changes in the area of economic development, in the areas of electricity conservation and in the areas of parallel generation.

There are two things I see that are important in those areas that are not dealt with in the changes in the act which change the mandate. One is the question, as I have suggested, of public attitude and public input into the process. There are several aspects to the public. There is the general public, and whether a particular approach to implementation of those goals is acceptable to the larger general public. The second aspect of the public in that respect is the public potential, both for conservation measures or for parallel generation measures. In other words, the private sector becomes a part of the public in this relationship between the public, the government and Hydro.

We do not see a clear mechanism in place in these amendments to either measure the public attitude or, on the other side of the coin, to use as a yardstick to measure Hydro's success at meeting goals and perhaps setting realistic goals in the first place in the areas we are concerned about, which are in this case parallel generation and conservation.

It is certainly true that a few years ago there was not in the Ministry of Energy the expertise to measure those questions. It is obvious that the minister has been changing staff and adding staff, and the ministry obviously will build expertise as the process continues. But the Ministry of Energy will never reach the point where it becomes the breadbox of all expertise on electrical energy matters. There will always be questions of expertise for which we have to consult outside of the Ministry of Energy and outside of Hydro. Again, we have no specific mechanisms yet in place to accomplish that kind of consultation and that kind of seeking of expertise.

An example of that is the question which is one of those most predominantly before us at present, one that the minister commented on in the House

just a couple of weeks ago, when he announced the ministry's policy on parallel generation. That is the question of the buyback rate and the question of avoided cost. We understand that the minister intends to do some kind of public review of the question of avoided cost. We have not been told yet what the forum for that or the structure of that will be. That will be important to the answer that eventually occurs. The timing, because we have had no announcement and therefore that review has not yet commenced, is extremely important to the process as well, as the minister fully understands.

Hydro is going to be tabling its preferred option or options this fall, and we are going to be going through some kind of review—again, yet to be announced—of Hydro's preferred plans. It is virtually impossible for us to adequately review Hydro's preferred plan in the absence of a number of things I have already mentioned; one of them being, for example, the method for establishing avoided cost and, specifically, what avoided cost should look like not only in 1989 or 1990 but what it should look like over time. Minister, that is the only way we are going to be able to define whether Hydro's estimates of the amount of parallel generation that can occur out there in any given time period are realistic, unrealistic or overly optimistic.

Nobody out there in the private sector portion of the public I referred to earlier can adequately answer the question of what they are prepared to generate in the way of parallel generation in the absence of this government and this Legislature having answered the question of what avoided cost is and what it will look like in the future; how it will be determined in the future, what will be the formula or mechanism or the hearing process or whatever the case is going to be. Without those questions having been answered, so many of the things set out here are not realistic to accomplish.

The same is true with the question of conservation. Without some public process by which we determine not only what is acceptable to the public but in which way, with what level of incentives or whatever the case happens to be, the public is prepared to participate in conservation, it is not realistic to define in any kind of useful terms whether the goals we have set are adequate, inadequate or overly optimistic. Without some kind of public process to answer those questions, we as a Legislature, you as a ministry, will not be in a position to effectively measure and determine or alter Hydro's preferred plan.

I think I have set out a number of the concerns I have with the things I see that have to be added

before the legislation will be effective. As I said at the outset, I think we made it clear in the second-reading debate that we support the bill. We are not convinced that by itself it will accomplish very much of what you have set out as its task. Without in fairly short order the Ministry of Energy defining the processes that fit the rhetoric, we will not get the job done in terms of adequately being able to assess and measure both the adequacy of the planning and the performance under that planning over the course of the next few years.

Hon Mr Wong: Could I respond? Maybe my officials could also add to whatever comments I might specifically make here.

First, I want to thank the opposition critic for his very constructive comments. I know he has thought very deeply and seriously about these issues for many years, and I put a lot of value in many of the thoughts he has put forth.

1050

We examined these issues from many different aspects when I first became Minister of Energy. All the staff from our ministry focused attention on this fairly major overhaul in trying to, fundamentally, first decide what would be the best direction in which to change the legislation so that we could achieve the goals which have been enunciated.

With respect to the honourable member's point about responsiveness to government and public attitudes, I think the honourable member said that the proposed legislation, as he saw it, seemed to address the first part, the government side of it, but there is the question, "What about the public side of it?"

Let me suggest to the honourable member and to all committee members that part of the legislative package involves information flow. Specifically, the whole idea is to make sure that the government and the public are in a better position to receive relevant information as early as possible so that we can be thinking about it. To specifically formalize these arrangements, we have enunciated that. Hydro will be providing long-range strategic plans so that in future, perhaps on a more regular basis, we will all be able to see where Hydro is heading a decade or more down the road. The other is in terms of annual operating plans because we also want to know what is happening in the immediate term.

I might point out that the proposed legislation does not take away at all—in fact it strengthens—the government's capability and ability to have various types of inquiries, whether they be technical advisory panels to handle very techni-

cal matters that might arise in terms of energy and electricity policy in particular, or whether it would be an existing board like the Ontario Energy Board which also has certain advantages in the way it is structured. It might be that the best mechanism could be the select committee on energy, which has the advantage of being able to allow for public input and for special interest input in a different forum and in a different way. There are special inquiries and other kinds of structures that can be used to ensure that the public has the appropriate mechanisms or panels through which it can make its viewpoints known.

I might point out that if we take this further, the fundamental choice was whether the Ministry of Energy should balloon in size and try to match Ontario Hydro in terms of employee strength levels and in terms of budgets. I do not think any of us are thinking along those lines.

Mr Charlton: Just one designated pitfall on each side.

Hon Mr Wong: Just one, okay.

The other, to be practical, was to make sure that the government and the people could have the information. But to ensure that the job was being done, we have section 8, I think it is, where my colleague talked about the policy statements so that guidelines would be given to Ontario Hydro. Furthermore, we wanted to quantify so that we could measure it. Therefore, you will see mention of targets in the memorandum of understanding.

These targets are not, as you know, permanently installed in place. In other words, if, after two or three years of progress, when the government, with the people, is reviewing the progress of Ontario Hydro in the area of parallel generation, conservation or energy efficiency—as we have already done, as a matter of fact, in the area of parallel generation, where our own officials have worked with theirs and we have used outside consulting information—and when we have come to the conclusion that we are being practical when, on behalf of the government and the people, we may say to Hydro, "You should increase these targets and aim for those more challenging levels." I think the encouragement of greater public input and the framework and the mechanisms overall that are in place help to enhance that objective.

I also wanted to comment on the honourable member's important interest in the avoided-cost question. I wish to assure all members of the committee that when we announced our parallel generation policy, we knew full well that an important part of the new parallel generation

policy was the determination of an appropriate avoided-cost methodology.

Frankly, it has been because of the concerns that have been expressed to us by various people about the financial aspects of the methodology, about the social and environmental aspects, to make sure that these matters are all properly addressed, that we decided if it takes an extra few weeks or an extra 60 or 90 days when we are trying to find the proper mechanism here so that we can address the avoided-cost issue that will probably be in place until it needs to be changed again—and that means that whatever is decided might be in place until the year 2000 or beyond—in our minds, an extra 60 or 90 days, plus or minus, whatever it takes, is probably time wisely and well spent to make sure this is handled properly. But I also want to assure the honourable member and committee members that it has always been my intention to try to make public as early as possible what our avoided-cost plans are, so we are working and moving as quickly as we can.

Lastly—I am sorry to be monopolizing and taking so much time—the honourable member made a point about the conservation plans as an example of what Ontario Hydro is doing in that area. How will we know, how will the public and the government know, that the conservation plans specifically will be detailed in the preferred plan that will come to the government this fall? How will we know if that is too much, too little, whether it is adequate?

One of the reasons for the government's asking Ontario Hydro to produce this preferred plan is so that we will know exactly how Hydro perceives that the electricity system in this province should be developing between now and the year 2010. What kind of financing will be needed? What kind of capital assets will have to be put in place? What kind of demand management and what kind of supply-side options should we be considering?

When that plan is tabled with the government and the people of this province, it is the government's intention to make sure there is a public input mechanism so that the issues like the ones that have been raised can be properly addressed and that people who have either a passing interest or a very specific interest in the issue, if it is conservation for example, can make sure their viewpoints are known and considered before the final decisions are made.

Mr Chairman, if you will permit, if I have omitted any important points, my officials might wish to add a point or two.

1100

Mr Ciemiega: Mr Chairman, I think we should also refer to the material, the Ministry of Energy Act, which, in effect, does give the minister additional powers which the member mentioned he might not have. Those will be such that the minister can, in fact, undertake research. He can commission all sorts of experiments. He can also set up or establish advisory committees relating to anything that comes within the purview of the ministry. So he has that power; he did not set it out again.

Mr Charlton: I was not concerned about his having the power. What I was concerned about, and the major overall concern that I have and that I think a lot of us have, is having a clear set of mechanisms in place both for regulating Hydro and for measuring its planning process and its success in implementing those plans and, in that, for ensuring effective public input. I will get into the public input thing in more specific questions later, because I think before the lunch hour others should have an opportunity to respond to the presentation this morning.

Mr Cureatz: It was just so gratifying that the session just ended and then we have all had the opportunity of listening to my colleague the critic of the Ministry of Energy go on at great length. It is a good way to start August and I can only say to the minister, I can remember when he was newly elected and we would be asking him questions. He just did such a super job of trying to answer the questions. But, of course, that was not the whole point of the exercise.

Now as I sit back and listen to him go on and on, you have come such a long way on saying lots but telling us nothing. We are looking with great interest to see if you are going to retain this interesting portfolio after this week or go on to other and brighter and bigger things, and maybe lesser things. So it is with a degree of frustration that we centre in specifically. If you are with us, wonderful; we will pursue our endeavours in September and October. If you are not, it will be so much fun to attack a new person and bring him up to speed on electricity. However, I am sure you will always have in the background a very able and capable deputy minister who will guide the possible new minister on the right and proven track.

My friend and colleague of the official opposition—because I only have to remind everyone the Progressive Conservatives are the third party, I say to my friend the member for Burlington (Mr Jackson)—unlike going on at great length, which I am never wont to do, I do

have some specific areas of interest just to reflect upon. We go more specifically to the Ministry of Energy presentation to the select committee on energy, on amendments to the Power Corporation Act.

I know there is a degree of frustration at not specifically centring in on the act, but with the liberty of the presentation in terms of the memorandum of agreement, I thought I could take the liberty of wandering a little bit with my questions, more particularly, page 3, power at cost, and the minister alluded to that in his closing remarks to the committee, but I am feeling uncomfortable about what that means. Have we worked that out: power at cost? I think we have all had an appreciation of when Ontario Hydro is supposed to do power at cost, but if you are going into cogeneration, what is the formula? Have you decided the method in which it is going to be determined; the cost of the electricity that you are going to be buying from a cogenerator?

I know my colleagues the New Democratic Party critics for a number of years have always been supportive of small, independent producers of electricity, but the frustration is that there would seem to be a lack of enthusiasm, from Ontario Hydro's point of view, of purchasing the electricity at whatever the necessary costs would be to ensure a fair return to the producer and to meet all his other obligations. What would you anticipate power at cost being in terms of cogeneration?

Hon Mr Wong: That would be determined by this avoided-cost public hearing.

Mr Cureatz: That is it?

Hon Mr Wong: That will, I am confident, be a very—

Mr Cureatz: You sound like the Attorney General (Mr Scott)—early fall, or was it late fall?

Mr Jackson: "In the fullness of time." That is the one I like.

Hon Mr Wong: Just to show you that I can be brief.

if you look at some of the literature on the subject, this question has been analysed in many other jurisdictions. I am thinking particularly of the United States. I know it can become very complicated in terms of whether we are talking about marginal costs or average costs.

This is something this hearing will have to determine, what is appropriate for Ontario in the late 1980s, as we move into the 1990s and to the year 2000 and beyond, when the public is definitely more concerned today about environmental protection than it was 10 or more years

ago and when the people of this province have said: "We find that reliability of electricity is important; we believe that low-cost, reasonable-cost electricity is important in terms of not only business and industry, but also in terms of our everyday standard of living."

These considerations are very complex. I am confident they will be considered when this public hearing takes place because there are some issues that would be very difficult to measure in the area of social concern or perhaps even some environmental ones. To answer the question very briefly and to the point, that will be the job of this particular mechanism.

Mr Cureatz: If I could just conclude, you had the opportunity of being around the big ivory bank towers in your private capacity. What would you think a fair return would be: 10 per cent of the capital investment or one that somehow covers the capital investment and a percentage above what power at cost is at Ontario Hydro? Do you yourself have a little handle on what you think might be worth while?

Hon Mr Wong: Let me say that there are many measures of profitability and fair return on investment. One has to look at the risk and the reward side. One has to look, for example, at the size of the project, what kind of technology is being used and the strength and reliability of the market that is there. But I think the more important question in terms of public policy here is, first, to ask ourselves, "What is the appropriate methodology and way for Ontario Hydro to base its purchase policy of electricity from the private sector?"

Once the methodology has been established so that both Hydro and the private sector are able to do a calculation of what the purchase price for electricity would be, then it is the private sector's responsibility to decide whether there is sufficient reason for it, in a corporate sense, to undertake that project or to undertake another one.

Mr Cureatz: Continuing on, and I remember your announcement of cogeneration, I listened with great interest to my friend and colleague from the official opposition and critic of the Ministry of Energy applauding your announcement. Of course, our position was supportive, but I have yet to appreciate it in terms of the environmental concern. It is great to say cogeneration, but what about those other aspects that we are looking so feverishly at in regard to, say, acid rain? One of the committees of the Legislature was looking at Ontario Hydro in its report.

It is not good enough for me to say, "Great, cogeneration," if you are not going to be looking at some of the environmental impacts in the area of the cogeneration that will be taking place. I guess I will answer the question for you and say that it depends on the amount of cogeneration or the kind of cogeneration that will be taking place.

Is anyone putting this into various pigeonholes so that if it is cogeneration of natural gas, you know the environmental impact, but if it is northern Ontario and a pulp mill, the amount of effluent that is going up the stack and turning the pulp mill wheels along with the generators to produce electricity? Do you think cogeneration is the be-all and end-all?

1110

Hon Mr Wong: We think cogeneration is a very important part of the supply-side options that this province has available to it. We are very lucky in Ontario. We are blessed to be able to have all of these different options at our disposal.

Let me say that when a primary fuel is used, it is said scientifically that the return or the amount of electricity or energy that has been created is about 30 or 40 per cent of the actual energy within the primary fuel that was used. In the cases of cogeneration of the type we are talking about, the return is about 70 per cent, so we are making more efficient use of the primary energy that is being used.

By making more efficient use of the primary energy to create electricity, in many cases, and steam, to use one example of cogeneration, it means there is less need for additional generation of electricity by Ontario Hydro through the building of huge major plants which in themselves are not environmentally benign but have environmental emission side-effects.

Mr Cureatz: So it is better to have many little cogeneration plants that are maybe producing energy at a higher efficiency yet causing pollution in the atmosphere, as opposed to building one or two large plants of whatever capacity, creating a huge amount of pollution. But if you add up all the little plants, I wonder if they would equal what the one plant would produce. Of course, it depends on what the one plant is; I appreciate that.

Hon Mr Wong: Of course, you used the important word "efficient." Because the cogeneration projects are more efficient—they are producing more energy of different types—it means that you need less in terms of generation. Just by that efficiency, we should end up with less pollution, less environmental negative side-effects.

Mr Cureatz: I somehow do not believe that, but of course we will just look in the crystal ball and we will look at it from different views.

Hon Mr Wong: Yes. Perhaps I am not explaining it as clearly as—

Mr Jackson: You are being too brief.

Mr Cureatz: Well, without going on at great length, I am just saying that I think we are all supportive of cogeneration, but there are spinoffs from it with which I do not feel comfortable yet. Maybe the Ministry of Energy or Hydro or somebody has investigated it. I just do not feel comfortable about whether in the scheme of things that is going to be—I guess it will not be the ultimate answer, but I just do not feel comfortable that it is as great as everyone thinks it is going to be.

Hon Mr Wong: Let me add one or two other aspects. We have many choices, as I said, on the supply side. Natural gas is cleaner burning than coal, to use one example, so in comparing those two fuel sources, the CO₂ emission levels from the natural gas would be about half as much as it is from a coal-fired plant.

Mr Cureatz: Of course it is more expensive.

Hon Mr Wong: Prices change, but if we have to, just looking for a moment at the environmental side, your point is an important one: price, technology, accessibility. All I am saying is that cogeneration can provide us with the option of generating electricity in a more environmentally acceptable way in some situations, which therefore would help the overall.

I might finish simply by saying there is experience in the United States that shows that cogeneration using natural gas has helped to solve a number of problems there. It may not solve all of our problems, as you say, but it has been an important option.

Mr Cureatz: On page 9, the mandate on economic development, "legislative authority to participate in new related business opportunities," that struck me as being passing strange. I know Ontario Hydro is very helpful in terms of investigations of various businesses that use a large amount of electricity. Can you expand on that?

For instance, in terms of tritium, would it be the assistance in setting up an industry in Ontario so that the tritium is not sold to the United States, since it is used in nuclear weapons, but encouraging a related business where tritium is used, and Ontario Hydro being an active participant in it, hence a publicly owned business, or do you just anticipate what Hydro is sort

of doing now, which is giving assistance to industries using electricity?

Hon Mr Wong: As I said in the House about five or six months ago, in talking about a subject like tritium, the government was looking at an Ontario-based usage of the substance. In terms of this legislation and what you suggest, the government has not decided as yet, but this kind of amendment would allow that and many other possible enterprises to take place that would be of benefit to Ontario Hydro and this province.

For example, Ontario Hydro has much expertise in much of the technology that it uses, of all types, whether it is coal-fired or gas-fired technology or in our nuclear plants. This is information that many other countries around the world would like to understand better. As a matter of fact, Hydro does co-operate and work with many countries around the world. This formalizes that kind of business activity, if I can use that term, that is not directly related to Hydro's main task, which is to ensure that Hydro has reliable supplies of electricity at reasonable costs.

Mr Cureatz: My friend and colleague very kindly gave me—I must have one around myself, I am sure, among my brochures—I am just looking at that esteemed board of directors; it is the same old game that has appeared before this committee over the last 10 to 12 years. I can tell you that, as distinguished as they all are, and they do a great job running Ontario Hydro, I would feel a little uncomfortable if they extended their tentacles into areas further afield than those that you have described.

If it is some kind of greater involvement in industry where they are active participants in the production of a particular item and in working in terms that a private corporation would, I would not be overly supportive of that direction that Hydro would take. It seemed to me, from your page 9, that that is the area of direction that you might be giving Ontario Hydro. Do you think it is, or do you not know yet?

Hon Mr Wong: I can be more specific and say that the intent of this particular amendment is energy-related, but having said that, it is important to recognize that the Premier's Council had specific recommendations, and the purpose of this proposed legislation is to make sure that Hydro has the ability to fulfil the government's initiatives in the area of the Premier's Council.

As a further protection, to make sure that some future governing body of this province does not abuse the principle and the thrust of what I just said, Mr Ciemiega has shown me Bill 204, page

14, subsection 59a(2), which in plain English says that this must be "subject to the approval of the Lieutenant Governor in Council," and subject to that approval, the corporation, Hydro, may "carry on related business ventures within and outside Ontario."

1120

Mr Cureatz: Then it goes back in the bill to say that the government, through the executive council, will have greater direction; if it authorizes Ontario Hydro to get involved in a particular area, it will. It will not necessarily be Hydro on its own, of course.

Hon Mr Wong: Yes, that is true.

Mr Cureatz: Winding down, I know how sad you all are. I whined in question period and committee so long in trying to get the free trade issue on, but I always seemed to be pre-empted by babies in Hamilton.

Mr Jackson: Neonatal intensive care beds.

Mr Cureatz: That is right, and educational concerns—

Mr Jackson: They are very important matters.

Mr Cureatz: I cried crocodile tears, so I will ask now.

Quite frankly, this business about ensuring security of supply for Ontario customers on a priority basis is so much smoke and mirrors as far as I am concerned. If you go up, as I am sure you have, to the Richview generating station, then you will see all the dials and clocks on the walls. They pick up the phone and call down to New York State Electric and Gas Corp or Texas Utilities Generating Co when someone is short down there and they direct electricity to go floating down through the wires. The electron that was produced up in Bruce winds up down in Houston.

Or we are a little short one day, and to save us from cranking up the thermo plant at Nanticoke we call up Connecticut Yankee Atomic Power Co and it zips up a couple of electrons to keep us going, because it is cheaper to buy than to set up a thermo plant. I am just not happy; this kind of continued proactive approach of making Ontario an island unto itself as regards the use of electricity is so much nonsense, because we are all interconnected in this northeast grid.

I have not had the opportunity of saying it in question period, but I want it to be said at least now that, when the Minister of Natural Resources (Mr Kerrio) was the Minister of Energy and he came up with this announcement, there was great fanfare and it looked as if the Premier actually

was doing something like attempting to cut his own cloth vis-à-vis free trade. I just do not think it is there, because no matter what you attempt to do, we are intertwined with the other producing states in the northeast quadrant.

We were there, whenever it was, so many times, up at Richview Transformer Station. Even at the last go-around, they had the map of North America, saying how it is all tied in and what not. I think you would be under some severe pressure if suddenly you said, "Ontario first," because it just does not work that way. Any comments about that?

Hon Mr Wong: First of all, just for clarification, I would like to remind all honourable members that any exports of electricity from Ontario or, to be clearer, any of these contracts that are entered into by Ontario Hydro, have to be approved by the cabinet.

Second, when it gets to discussion of an emergency and shortages of electricity, in this case these amendments that we are talking about here do not interfere with the emergency sharing arrangements between utilities. The authority which Ontario Hydro has to allocate power in the event of an emergency is not affected by these amendments.

Above and beyond all that, in straight commercial terms and in terms of the United States trying to impose its perceived rights under the free trade agreement and say, "We want your electricity because we need it here in the United States"—I was reminded in the last several days of one of the maritime energy ministers, who explained it to me very simply. I found this astounding, as we are beginning to see with the different legal cases that are coming up, but it helped to reinforce the point that I was just trying to make. If one country has some legislation in place and the other country does not—if Ontario did not—then in case of a dispute, the laws of the jurisdiction that has the laws in place will prevail.

In our situation, I think that we have had the foresight to make sure—because I remember during the time when these amendments were originally introduced in the House, some honourable members and other people were asking the valid question: "Why bother? Hasn't this always been the case historically in terms of electricity exports from Ontario to the United States?"

We said that might be the case, but with the free trade agreement, it will still probably take five or seven years or longer to clarify many of these very important points. We have it on the record and in the legislation, so I think it makes very clear what our intent is.

Mr Cureatz: With electricity exports, can you envision a greater participation of Ontario Hydro in the production of electricity to get into the export field more than it is now?

Hon Mr Wong: At the present time, no. It has been the government's policy direction, and Ontario Hydro's operational direction also, to focus predominantly on the production of electricity for our own domestic use.

Mr Cureatz: Finally, with this introduction of the bill allowing greater intervention by the executive council into the affairs of Ontario Hydro, do you feel confident that Ontario will be supplied with sufficient electricity, with all your various combinations of cogeneration, etc, by the year 2000?

Hon Mr Wong: I am confident that Ontario is running on a very sound and reliable electricity system. I am confident that if we continue to work diligently along the lines that the government has pursued through the demand/supply options study, the draft demand/supply planning strategy and now the preferred plan, if we keep our eye on the ball and make sure that we address, discuss and analyse the tough issues, eventually we can make those decisions that are needed for the longer term, as well as now, through our energy efficiency and conservation priority first component, plus our stimulation in trying to help remove and lower the barriers and therefore help the parallel generation sector to produce more of the electricity in Ontario. These are the kinds of things that make me feel confident that we will accomplish the job that has to be done.

Mr Cureatz: No further questions.

Mr McGuigan: I would just like to express another point of view to the critic from the official opposition, and that is the matter of discovering avoided costs. It seems that what we are talking about is the question that business wrestles with every day—I particularly call upon my background in agricultural marketing—and that is price discovery. Where do you discover what is the proper price?

I guess I am going to reveal my philosophical bent, as opposed to my honourable friend's, and that is, I think history has proven to us that the best place for price discovery is out in the market. If we want to look for examples, it is happening this very day. In Poland, they are lifting the price controls on food and putting it into a free market.

Just as a little aside to my comment, that is going to end up hurting Canadian agriculture. It will benefit the people and farmers in Poland,

because once you put a free market into effect, the farmers over there will produce all the food they need. They will not need any from Canada or the United States. I am just emphasizing my faith in the free market as a method of price discovery.

My memory and experience goes back to the wartime price and trade board. It did not work. Rent review does not work. The things that are happening in the other parts of the world where they are moving from centrally planned into market economies do not work. My distrust is of accountants and people who can come up with results. You can build a high price or you can build a low price, depending upon what your objective is as the accountant who put these figures together.

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What I am suggesting gives a lot of consideration to, rather than spending millions of dollars and coming up with a price discovery figure, which is in my view often erroneous, put out offers to the market and the community. Offer them so many megawatts at a certain price. Set a goal of so many megawatts and keep adjusting your price until you achieve that response.

I want to ask another question. If private industry can produce hydro or power, we will say, at three and a half cents a megawatt, and your avoided cost is seven, why as a business person would you pay them seven? It seems to me the price discovery market would set that price somewhere in between there. It would be fair to both parties. It is fair to the producer and it is fair to the consumer who is consuming the electricity. I suggest that you really cannot get a fair figure unless you use the market price.

The other thing, minister, that I certainly like about your announcement, in spite of the questions raised by our good friend from the third party, is this idea of going into other businesses. I might just tell you that this is my third or fourth time on the select committee on energy and I got thoroughly convinced of the needs for conservation and decided to personally do something about it. I live in a rather large old home and it has a pretty hefty electrical bill. I decided to invest in some of these new—what is the opposite of incandescent lights?

Interjection.

Mr McGuigan: Fluorescent lights. I tighten the screw in the regular receptacles. I think the figure is that for the equivalent of 75 watts of light from an incandescent, you get the same amount of light from a fluorescent for about 18 watts. So I went to my friend the supplier and I

found a spotlight, which is one of the big consumers of electricity, especially an outside light. Spotlights cost \$60 apiece and I was able to negotiate a 40 per cent discount and got them for just over \$45 apiece.

When I got home I found there were hardly any places I could put them. I found one over the sink that had a sort of recess. You have to have a recess to put these things in. You cannot just screw them in an ordinary socket, so I found one. Then I found three outside of the house and I put them up, but when you look at the instructions it says not for outside use. I put them up anyway because they are at a spot where there is quite an overhang and the weather may not get to them, but the test will be this winter whether they work or not.

They also have a small bulb—it takes the part of a small bulb—so I went around looking at all the lamps for one of these small bulbs to put it in. I could not find one lamp that it would fit. There is that space between the receptacle and the arch that holds the shade. I do not know what you call it, whether you call it a banjo, harp or whatever you call that metal arch. There is not room in there. I did find one down in the basement: a hanging receptacle from the ceiling that would take one of these things.

The point I am making is that, theoretically, there are all these fantastic savings out there that can be made by going to fluorescent lights, except that you cannot do it. All it would mean is somebody making some proper arches from banjos or frames or whatever you call them. It may be producing some different-style lights. It seems to me if we are really serious about contributing to electricity, we have to go further than the theory and that may mean actually going into some related businesses.

One thought came to my mind, and I discussed this with the local Hydro manager. I could buy those bulbs at 40 per cent off and the company, I presume, is still making 10 per cent, because they are working on a higher percentage or they are working on a 50 per cent profit, maybe even 60 per cent gross profit. They are still making 10 per cent on it. We have these Hydro offices all over the country. Why can we not use those Hydro offices to promote them and let's retail the cost. Some of these items would not really cut down on the need to produce more generating stations.

So those are a couple of points I had questions to about the free trade, but I think you have answered them. One of the things we are seeing already is that the United States is applying the

free trade rules very, very vigorously to the letter of the law and not to the spirit. I certainly believe we are going to see a great deal more of that. Having been on a committee visiting one of those law offices where the people specialize in tariffs and trade, I saw what a huge operation and a huge staff they have and how their business is centred on the letter rather than the spirit of the law.

So I feel a little bit better about the fact that you have made this move. At least we have a sound foundation and a basis to meet them when, in my view, it is going to come. They are going to hit us in every way they possibly can. I congratulate you for your presentation and whatever announcements come tomorrow or whenever. I wish you well.

Mrs Sullivan: I thought that I would like to go back, if I could, to the thinking behind the changes in the Power Corporation Act. They have certainly been a long time coming and I think that they will be welcomed by the government, the public and Ontario Hydro. It seems to me that there is a strong working relationship that exists now and that Ontario Hydro has indicated, certainly publicly, that it likes some of the direction that you have taken with this act and with the memorandum of understanding.

I think one of the reasons that the act is welcomed is, of course, because of the enhanced communications between the government and Hydro or with the public. I wonder if you could expand, stepping back from the content specifically of the act, to the kind of choices relating to where the government can and must be involved in policy areas and where there might be some difficulty, given the policy area thrust, of moving into the operational side.

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If I can just talk about this for a second, for example, from a public policy point of view we might say that environmental protection is a must, that conservation is a must, that efficiency is a must, that nonutility generation is a must and that demand measurement is a must. Those are very clear policy areas that are understandable and are goals, areas that must be striven for.

When, however, the government also says that as a policy matter certain forecasts must be made and a certain goal reached, say, in demand management or in parallel generation, are you moving into that operational step and how do you see the difference between the policy development areas and what, in a kind of nuts and bolts organization like Ontario Hydro, could also be interpreted as an operational policy?

Hon Mr Wong: Mrs Sullivan has asked a very, I would say, important question. It hits at the heart of this legislation. I think, in the way in which she has raised the question, it also shows the complexity. Let me choose as an example the area of energy efficiency and conservation.

It is clear from government policies, enunciated policies, whether it is in the area of energy—because we want reliable supplies of energy generated at reasonable cost to the people who are consuming it, but we want to do it in an environmentally sound way, which really means, from a practical standpoint, we want to make sure that we are meeting the specific emission standards of the Ministry of Energy.

So within the context of government policies we have to decide what target levels are achievable, practical and reasonable. In talking to the experts and other interested people within our society at large in this particular case we hear everything from low-target levels to extremely challenging, very high-target levels. There are some people who have said to the government in our lifetime, if the government policies and Ontario Hydro's implementation of those policies in the area of demand management and parallel or nonutility generation were exploited to the fullest, if it unfolded in that way, it might prevent the need for building a huge new major power plant. People are saying this to me within a lifetime.

So there is a spectrum of views there, and it is the government's responsibility—that is why I wanted to make that clear—in listening to all of the different input that comes in, whether it is through committee hearings like these or whether it is through special-interest groups, to assess this information and take a responsible position. Hopefully we are making a right decision from the whole context. But having made its decisions on where it believes government policy and direction should go, then we get down to the implementation.

As you know, in the area of Ontario Hydro and energy efficiency and conservation a few years ago there was no formal target that I am aware of. The cabinet took the initiative a year and a half or so ago and requested that Hydro give us some quantitative figures that we could all measure our progress against and its specific progress in that area in all of the things it might do explicitly or implicitly to arrive at this goal.

The wonderful thing about living in a democracy, and I think in the system that we have here, is that Ontario Hydro had the flexibility, in trying to operate under sound business and commercial

principles but at the same time trying to be responsive to the government policies, to find the best possible ways.

Of course that is exactly the process it is in, but to make sure that the policy goal and the quantitative targets are met, we have this information flow that you talked about so that we can constantly monitor and from time to time, if need be, make a change in terms of the targets.

I hope I have not been too wordy, but I tried to take your very penetrating question, which is very complex because it touches so many areas, and just try to reduce it down, in the case of one example, to show that the government's policies as well as the operational mechanism of this utility, I think, can be operated efficiently and responsibly under the new proposed legislation.

Mr Matrundola: I just have a couple of questions here. Do you foresee the cost of hydro increasing or perhaps decreasing within the next decade or two?

Hon Mr Wong: Based on the experience of the last 14 or 15 years, I would say that the Ontario Hydro bulk wholesale rates have generally increased in line with the increase in inflation.

Mr Matrundola: Generally speaking, whenever you buy anything in volume—in great quantity and so forth—it seems that you can purchase it at a lower price, but with hydro it appears that the more we need, the more it will cost. Hence will come in the suggestion and hopefully the co-operation of the public at large on conservation because it costs so much to produce it.

I would like to see and explore the possibilities of providing the necessary hydro and at the same time attempting to reduce the costs, because for many people, including myself, I find it excessively expensive and we should find new ways of reducing the cost of hydro.

One thing comes to my mind. For example, just looking at the ceiling here, I can tell that you are wasting a lot of energy in this very room because of the type of screening that we have from the lights. In a room of this size, we should not be using the old light bulbs we have here. Other countries that do not have the abundance of hydro that we have would use a different ceiling, shielding the lights, because it is a waste of energy right there—a great waste of energy.

I know that we go for looks perhaps. The bare bulbs may not look as beautiful as it looks with the screening, but there is a waste of energy right here, and when you think of all the buildings in

Ontario, you can see the great waste of energy right there.

Also, with respect to the cost of building a new generating station, a nuclear station and so forth, I have yet to see a project that comes on stream on target. We have the dough. I believe it was forecast as \$250 million and it has gone to \$500-and-odd million. I do not know why. With generating stations and nuclear stations, the forecast is that they are going to cost so much in the estimate and then it ends up costing double.

I am not criticizing you, I want to make that very clear, because I really believe that in the two years you have been the Minister of Energy you have performed exceptionally well as a new minister in charge, but of course now with two years of experience under your belt, I believe we should look at the future in a different light and we should take into account and consideration the need of the people of Ontario.

We should try perhaps to spend some money on signs; on people creating a new type of light bulb that consumes less; other kinds of motors and generation, motors that will consume energy and so forth; perhaps where we can save energy, if it costs so much to reproduce it; or exploring as well other ways of producing energy in a manner where we can offer the public a saving in the cost of energy, because it appears that it goes up and up all the time.

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As we all know, we all tend to waste. I believe a continuous public campaign to save energy, to switch off that light in that room or that hallway that is not needed, because you will find out at the end, when you go to pay the bills, you are paying so much—Obviously, if they have been leaving the lights on all the time, that costs money. Maybe timers, whatever the case may be, wherever we can save. Perhaps we should engage also in a campaign of that nature to try to save energy.

Hon Mr Wong: I would like to thank Mr Matrundola for his comments.

I just wanted to say that in the demand management-parallel generation sector, as you know, the Ontario Hydro target is about 5,500 megawatts by the year 2000. The report my friend Mr Charlton and his party tabled a few weeks ago had a combined total target of about 5,300 megawatts. The only point I am trying to make is that I think there are many sectors of society and government that are saying that there is a lot that can be done there. Even our own government position, of course, is that we think

more than 5,500 megawatts can be done and perhaps in a more timely way.

Let me put it in different terms. If you use Hydro's 24 per cent reserve margin figure, that would be equivalent to putting in place a capacity of about 8,000 megawatts. That is equivalent to two and a half Darlington's.

Whether it is enough or not enough, whether these target levels are high enough or not, I simply want to make the point that we have made a lot of progress in the last two years. These targets will be reassessed from time to time, but I think we are on our way towards implementing what we think is an appropriate and proper set of demand management and supply side options. Of course, this will get even more focused when the Hydro preferred plan comes in in the fall.

Mr M. C. Ray: My question is related to Mrs Sullivan's and to the relationship between sections 9a and 9b of the amendments; policy statements and the memorandum of understanding.

Inasmuch as the section dealing with policy statements indicates that the board shall use its best efforts to ensure that the exercise of power by Hydro broadly conforms with the policy statement, yet the memorandum of understanding sets out the accountability structure, I would like to know: Is it the intention of these two sections that the memorandum of understanding will constitute a complete statement of government policy that Hydro must comply with? Is that the intention here?

Hon Mr Wong: The first amendment you referred to establishes the mechanism for the establishment of policy framework, so that Ontario Hydro will have a framework within which to operate. In plain English, it means that the government will be giving Hydro these guidelines, subject to having the Minister of Energy move into the chief executive officer's seat over at Ontario Hydro. It does all but that. Hydro's responsibility is to run the day-to-day operations. It will do everything from counting the paper clips and making sure there are enough pencils in place to the other, obviously more complex, operational decisions.

The next amendment you referred to on the memorandum of understanding lays out more specifically the government's goals and objectives for the first three years. This would more efficiently lay on the table exactly what the government is telling Ontario Hydro to accomplish within that policy framework. This avoids the need to create a whole list of policy statements. The memorandum is a document that

is targeted for the immediate term. At the end of the three-year period or sooner, the memorandum could be updated. I hope that helps to explain the context of the two amendments.

Mr M. C. Ray: Where I am having trouble is in this area. Let's suppose that government policy of other ministries is enunciated by other ministers. In order to be compelling upon Hydro, does it have to be incorporated in the memorandum of understanding before Hydro will take notice of it?

Hon Mr Wong: No. Cabinet would consider the minister's policy. If cabinet agreed with that policy, then the Minister of Energy would instruct, through that amendment, Ontario Hydro to live up to the new cabinet decision.

Mr M. C. Ray: As I said, what I am concerned about is not the Minister of Energy's policy statement but other ministers' policy statements. It says here that you may issue policy statements which are to be taken note of by Hydro. What of the policy statements of the Minister of Natural Resources, the Minister of the Environment?

Hon Mr Wong: That is exactly what I meant. Any minister could bring to cabinet a change. Let me ask legal counsel to give you something more precise.

Mr Ciemiega: One thing we should remember is that we have expanded the regulation-making powers under this act. One of the expansions reads as follows: "The Lieutenant Governor in Council may make regulations prescribing other matters to be set out in a memorandum of understanding." So theoretically the government could make a decision that it wants something in that memorandum. It would do it by regulation. Once the government does that, then I believe the parties would have no option but to deal with that matter and have it inserted into the memorandum of understanding. Once it is there, you have a provision in the act which now says, or will say, that the corporation shall comply with the memorandum of understanding in exercising its powers and duties under this act.

Mr M. C. Ray: If we regulate policy of other ministries or this ministry and then that becomes incorporated in the memorandum of understanding through that mechanism, but we do not usually regulate policy. We do not usually have policy statements. They are usually in the form of ministerial statements, are they not? What I am questioning is whether Hydro is under any obligation to take into account other ministerial statements of policy which are not issued by the

Minister of Energy and which are not included in the memorandum of understanding.

Mr Ciemiega: There is nothing specific in this act which in fact says that Hydro has to—

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Mr M. C. Ray: That is the way I read this act, that it is not specific with regard to that question.

Mr Ciemiega: That is right. There is nothing specific in this act, but I would think that prudent members of the board of directors, knowing what government policy is, would take that into account in making decisions.

Mr M. C. Ray: But the way I read this is that it is very easy for Ontario Hydro to conclude that if it is not in the ministry's memorandum of understanding and if it is not issued by the Minister of Energy, it is not necessarily something it has to take notice of. I think here we are concerned about the goals and objectives of other ministries as well as the Ministry of Energy.

Hon Mr Wong: Let me summarize again. The policy statement has to be approved by the cabinet, from whatever minister. That is number one. That will take place and there will be an official policy. I guess it is in the words you read earlier. Subsection 9a(2) simply says, "In exercising a power or duty under this act, the corporation shall respect any policy statement." It does not say whether it is in the memorandum of understanding or not that that relates to its exercise.

First, if there is a policy statement, it has to be done. Second, as Mr Ciemiega has said, it could be included specifically in the memorandum of understanding. Third, to answer Mr Ray's question, I would again point out that one of the amendments provides for the creation of this small committee of ministers that will be headed by the Premier. From year to year, the issues of the day might change, so it would be the Premier's prerogative to change and perhaps include a minister responsible for an area that is of much greater public concern.

Again, there is a mechanism there whereby cabinet ministers other than the Minister of Energy can make sure that certain policy or philosophic directions of the government are being listened to and carried out if necessary.

Mrs Sullivan: I just wanted you to clarify this. My reading of section 9a, as it would be amended, would be that the minister, being you, the Minister of Energy, would basically translate to the corporation any policy statements that came from cabinet.

Hon Mr Wong: Right.

Mrs Sullivan: It would not matter where they emanated from. They could be from the ministries of Environment, Health or from anywhere else. It would not have to be from the Energy ministry, but you are the transmittal vehicle?

Hon Mr Wong: Yes, exactly.

The Chairman: I have a couple of more speakers, and Mr Ray is not quite done. We are at the normal adjournment hour, but what I would propose is perhaps to go on for another 10 or 15 minutes and wind up the questioning now, if that is agreeable.

Mr M. C. Ray: Just a quick question dealing with the existing subsection 3(7) and the linkages between government policy and Hydro. That subsection seems to say that it is not unlawful for a member of the Legislative Assembly to be on the board of directors of Hydro. Would you be contemplating making a recommendation to cabinet in that regard, that members of the Legislative Assembly be appointed directly to the board of directors of Hydro?

Hon Mr Wong: No, that is not the intent or the thrust of subsection 7 that you referred to.

Mr M. C. Ray: What is the intent of that subsection?

Hon Mr Wong: The intent really is to ensure that Hydro has a competent board of directors that reflects many of, let's say, the talents and concerns the people of Ontario would have, in order that Hydro, as a corporation, could execute its duties as newly defined under the proposed legislation in as fine a way as it could. The intent is not to complicate matters in any other way.

Mr M. C. Ray: If our objective here is to make Hydro more responsive, and we have a specific section of the act which seems to allow members of the Legislature to sit on the board, why would it not be the thrust of the minister to suggest that that be the case, that recommendations could be forthcoming in that regard?

Hon Mr Wong: Let me answer by saying that it is a judgement call. I know that in some provinces, British Columbia in particular, the energy minister actually sits on the board of directors of the utility of the province. As I said before, we have to make some decisions here. Do we want a system where, for example, Ontario Hydro became a part of the Ministry of Energy? The Ministry of Energy would then have 30,000 employees and a budget that is whatever it is. We have to draw the line. I think that at this point in time, while this section does not prohibit what you have suggested, it is not the government's

intention to do anything different from what I had proposed.

The Chairman: Mrs Sullivan, did you have a supplementary on that line of questioning?

Mrs Sullivan: Yes. It relates to the board and is really two questions. Could you briefly talk about why the board would be increased to 17 from 13? Start with that one and then I will remember the other.

Hon Mr Wong: There were a few reasons. One reason was, as stated earlier, to make sure that in trying to meet the thrust of the proposed amendments and MOU that we have a corporation, Ontario Hydro, that is as responsive as possible. We felt it would be advantageous to increase the size of the board from 13 to 17 for that reason, while at the same time trying to make sure the board did not become overly large. So one reason for the expansion was responsiveness.

Another, I think, came into the area of the more practical operational things, like having quorums. We live in a much busier, more complex world these days. People having to get together, quorums and meeting times were another consideration along with some others I have forgotten. Those would be two of the main reasons.

Mrs Sullivan: The other question related to—I do not know if we will get into this in clause-by-clause very much—changing the mandate of the standing committee on finance and economic affairs.

Hon Mr Wong: I think the purpose of the change there was mainly to give the finance committee some added responsibilities. In line with many large corporations of this size in Ontario and Canada, if not North America, in terms of audit committees and other committees that might be subcommittees of the finance committee itself, we felt that instead of having such a restricted and limited structure it would be wise to give the board, into and through the finance committee, some additional responsibility and power so it could administer those responsibilities consistent with what I would call sound business practices in today's business world.

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Mr Charlton: I would like to start out by going back to the question which Mrs Sullivan raised earlier. That is the question of whether or not the amendments to the legislation went beyond just areas of policy and perhaps intruded into questions of operation in Hydro. I would like

to get that side of the discussion cleared up before we move into some of the other questions I have.

First of all, is it not the case that it has always been true; that the government control over Hydro has been not only in the nature of policy but operational? For example, the ability to approve capital construction and borrowing plus, in the case of the Davis government, its refusal for 10 years to allow Hydro to proceed with the southwestern transmission corridor, was in fact direct imposition in the day-to-day operations of Ontario Hydro. The kinds of things you have set out in this bill are simply, if you like, operational intrusions which cover the areas of expanded mandate that you have also set out in the amendments.

Hon Mr Wong: Perhaps it is a matter of semantics, so I will try to speak in as plain English as I possibly can by saying that Ontario Hydro's responsibility is the day-to-day operation, the operational side. The government's responsibility is in the policy area, to set the policies and the framework within which Hydro should operate.

You are quite correct in saying that when Hydro is going to embark on a major capital program, to use that as an example, it does not do so independently but does so with the approval of the cabinet. We would consider that relationship to be Hydro and this legislation making sure that Hydro is responding to the public interest.

Mr Charlton: I do not wish to unduly startle the member for Essex-Kent (Mr McGuigan), but I would like to inform him that we do not disagree in terms of the question of avoided costs from a philosophical perspective, as he put it. Perhaps if he pays very careful attention, during the course of the hearings at the end of September and early October, to the other presentations that occur, he can start to understand what we do disagree on.

We do not disagree about whether the marketplace should determine ultimately what the cost of power is in this province. The reason the minister is aware that he has to deal with the question of avoided cost in a review process is that it is not clear that there are not serious barriers in the way of the marketplace doing that freely. That is what the debate is about, not whether the market should determine things or not but whether there are serious barriers standing in the way of the market doing that job for us here in the province.

Along those lines, since I do not think you are in a position to tell us exactly what the review mechanism will be on avoided cost, there are some aspects of the avoided-cost question which,

from my perspective, are important to be included in what is reviewed, so I would like to elicit your comments about whether or not they will be.

On the question of avoided cost, I think everybody has a fairly simple definition of avoided cost hanging around in his head, avoided cost presumably being the cost per kilowatt of what the next new generation facility built by Ontario Hydro is going to operate at. If you go back to the documents that Hydro presented to the select committee a year ago, it clearly set out what the hangup is around the question of avoided cost.

There is no question that in the year 2001, from Hydro's perspective, avoided cost will be whatever the cost is going to be out of the next nuclear plant, but in 1989 Hydro says: "We don't need any new generation facilities presently. Therefore, avoided cost is not the cost of the next avoided new capacity because we don't need any new capacity right now." At the same time, in the planning process they are telling us that they are going to have to make the decision very shortly about the planning of that next facility.

Part of what we have to get around or determine in the review of this question of avoided cost is the timing of avoided cost once you have decided how to determine it. That may mean considering the interests of Ontario and the public in Ontario before or above the interests of Ontario Hydro.

To put the question another way, we may at some point have to see some red blood on the Hydro ledger book for a short time in order to offer an avoided cost that reflects the next generation facility's costs in time to bring in parallel generation or conservation in order to avoid the construction of that generation facility. I think the minister understands that debate.

In the process of trying to design your review of the avoided cost question, are you taking all of those complex and in some respects somewhat convoluted and not easily defined aspects of avoided cost into account and will you be designing a review mechanism which ultimately will ensure that we end up with something in place as a definition or formula for avoided cost that takes into account the planning time differentials that large generation facilities require?

Hon Mr Wong: The simple answer to the honourable member's question is that my intent is to try to make sure that this review process is as objective and comprehensive as possible. In other words, I would want to explore this

important issue and question of avoided cost in as full a way as possible.

Mr Charlton: So there will not be any limits, at the very least.

Hon Mr Wong: It has been a question that has been hanging around for too many years. I think the purpose here is to make sure that we have what is genuinely a proper hearing on this subject, so that when the decisions and the recommendations come forward, this should be the methodology. We can all be confident, wherever we sit, that we have all had our chance, we have all debated it and this is the way it should be.

I just wanted to add to the answer briefly and say that I have actually had suggestions from the parallel generation sector, as maybe some of you might have had, and we invited their suggestions. At this point in time I do not have a precise list of the things that will be included—

Mr Charlton: It is okay; we have them.

Hon Mr Wong: —but I hope that many of their concerns have been and will be addressed by this hearing.

I have a list of certain components here. I do not want to take a lot of time. Let me just highlight five things so the honourable member will know that these are the kinds of things that will also be considered: the short- and long-run costs faced by Hydro in the areas of generation, transmission, distribution, purchase power and overheads; costs related to local transmission and distribution need; environmental costs, including but not restricted to costs related to acid gas reduction measures; costs of major maintenance, upgrading and life extension at existing generating stations, and social costs, where measurable, to the extent possible. Hopefully, that will give you some idea.

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Mr Charlton: So that leads perfectly into my next question and it goes back to the concern I expressed this morning in my general comments about public participation. You responded by talking about an information flow out to the public. That is great and we think that is wonderful that the public be better informed than they have been in the past about Ontario Hydro affairs. On the other hand, I am more concerned, in addition to that, about the public input mechanism.

For example, you have just rhymed off a lengthy list of matters which will be considered and I would define that list, that you have just rhymed off, as the economic and technical cost

that Hydro will talk about in a review of avoided cost, that the parallel generators will talk about at a review of the question of avoided cost, but does not necessarily take into account a public attitude or a public preference. Let me just take that a little bit further.

All of those things have to be looked at and there is no question about that in the list you have rhymed off—but in addition to that, if you go back through what you have set out as the goals ultimately for this whole process in responsiveness to the public—the public may in fact, as they become more aware of the possibilities and the potentials, both in terms of parallel generation, industrial cogeneration, conservation and the range of other possibilities, take a quite different attitude than they presently do.

For example, if you look at the conservation supply curves, both in the original Marbek study that you had done, the updated study which you have just released or if you look at the way we approached the question of electrical energy efficiency in our study all of those supply curves were done basically based on energy efficiency at or below the average cost currently on the Hydro system which is roughly in the five-cent-a-kilowatt-hour range.

There is nothing above five cents a kilowatt in any of those studies, but perhaps once the public is better informed about the potentials out there, the public may say, in order to avoid certain environmental impacts or in order to avoid more transmission corridor strung all across this province etc, that we would be prepared to pay a slight premium for conservation above the average cost or even above the avoided cost of Hydro's next generation—or the public may say that we would be prepared to pay a premium for cogeneration if the cogeneration was situated in such a fashion that it eliminated the need for transmission lines. In other words that the cogeneration could be utilized where it was generated.

What kind of mechanisms are you looking at to start to see some of that kind of public input happen so that we could get it. In the same way as we all discovered to our, I think, considerable surprise—when you think about the Canadian taxpayer as somebody who hates paying taxes in general, saying in the polls, for the last number of years in a row now that they would be prepared to pay even more taxes if they could be assured of a direct environmental improvement as a result. That is specifically set out in the acid rain questions for example.

Hon Mr Wong: I would like to answer that question in three parts. Number one, the review process, with respect to the avoided cost issue itself, I trust will provide a vehicle through which the public can express exactly these views. Secondly, the question of how the preferred plan from Ontario Hydro will be evaluated, analysed, assessed and where the public again will have the opportunity to have its input, to me, provides an opportunity for the public to express itself.

Thirdly, at some point, the government will take its responsibilities not just in the energy area, but perhaps in nonenergy areas that you mentioned. The government could under this framework, decide that, "Yes, it has enough information from these processes and will make some decisions. If you are suggesting that there should be another special mechanism for public input, then I say that would be something the cabinet would have to consider. But let me assure the honourable member the intent of all of this is to make sure that we hear the suggestions to the very difficult issue he is raising. I am confident that, one way or another, it will be covered in these processes.

Mr Charlton: Just one last question, a very specific question about the Ontario Energy Board: The 1986 select committee on energy basically recommended that the Ontario Energy Board be the review mechanism and the regulator of Ontario Hydro. Essentially that select committee made that recommendation for two reasons: first, because we felt there was a significant body of expertise evolving there, but, second, we in that all-party committee also felt that to start recommending the creation of a whole bunch of other regulatory bodies might not be too well accepted by a government trying, on the one hand, to deal with some questions it had made commitments to deal with but trying, on the other hand, to be cost-conscious and relatively responsible.

You have displayed an extreme reluctance either to commit any of the things you talk about having reviewed to the OEB or to make the broader commitments that the select committee suggested, that virtually all matters related to Hydro should be reviewed by the Ontario Energy Board—its rate hearing every year, the question of avoided costs, the buyback rate, the questions of its long-term planning, preferred plans and so on. Can you perhaps express for the committee what your reluctance about the OEB is and, at the same time, give us some kind of indication of whether you are looking at the OEB for some of

the tasks the select committee recommended or some mechanism that is completely different?

Hon Mr Wong: Let me say that, on the contrary, I regret that it has come across as being a sense of reluctance. Actually, I think I would prefer to say that we have just tried to be extra thorough or extra cautious. With respect to the OEB and avoided costs, I certainly have said publicly and to the media that this is one of the strong options that is on the table. But in view of the other concerns people have raised—environmental, for example—is there a better mechanism or is that the way to go? We are determining and we will decide in due course. The OEB, as you indicate, has certain advantages. We are simply weighing the advantages and the disadvantages.

The other thing, about the more fundamental questions you ask with the examples you gave about the role of the OEB and what the select committee had recommended in 1986, is simply to say I am cognizant of the ideas and concerns that have been expressed. We have implemented some of the select committee's recommendations. We are in the process of implementing many more or at least addressing them yes or no through the changes in the legislation here, Bill 204. On the OEB, that would be the next step. I hope that the next piece of energy legislation that this government addresses in a major way will be the Ontario Energy Board Act itself. That will give us another opportunity to debate more fully the role of the OEB in the wider context.

1230

Mr Charlton: Just on the same issue, picking up on one of the things you have mentioned there, whether the OEB is the right mechanism and the environmental concerns that get raised, although it has not been a major issue in the past, both of the opposition parties have, in discussions around that question of the OEB regulating Hydro and the concerns about the environment and other planning matters outside of the OEB, stated that we would be prepared to entertain amendments to the Consolidated Hearings Act to accommodate that process in any way that is necessary to satisfy both the concerns of environmentalists and even municipal or regional planners in the effective mechanism to regulate Ontario Hydro through the OEB.

So we would certainly be prepared to entertain any necessary moves along those lines to make a system that is focused and yet workable with other concerns, outside of just regulating a utility.

Hon Mr Wong: Thanks for bringing that to my attention. I think that is a consideration that is worth looking at.

Mr McGuigan: I want to respond to one of the remarks Mr Charlton made—I guess it may be a surprise that I tend to agree with him—when he spoke about the avoided costs, as compared to today and as compared to the year 2001. My point is I see that as part of the marketplace in that the market is made up of buyers and sellers. Part of the buyer's decision, which would be Hydro, would be to put a price on what it expected to meet in the year 2000, but not based on what economists might project.

May I remind you that in the early 1970s the economists were absolutely certain, and they lent all sorts of money to Latin American countries on the basis of oil being \$100 a barrel. That was what the economists said, "It'll be \$100 bucks a barrel." You can go back through a whole litany of things where the economists were wrong. The market crash of a year or so ago was supposed to be 1929 all over again; it did not happen. So I agree with him that you have to look at those—

Mr Charlton: I do not disagree with you in terms of whether to trust the economists to decide what the avoided costs will be in 2001. We agree.

Mr McGuigan: But I have a question based on your remarks, Mr Minister, about bringing in an electrical code. I was brought into this because, as parliamentary assistant to the Minister of Energy a couple of years ago, I dealt with a farmer who had tingle voltage in his dairy barns, which since has been largely cleared up and a settlement made and everybody is reasonably happy. But in his particular case, he was at the end of the line and he was also on a line where the load had been building up over the years, as people put in washers and dryers and far more equipment. I understand the technical point: this is where you get a lot of troubles. It is an end of line and a line that is overloaded.

In this particular farm, we did an awful lot of research and brought in engineers from the United States with some very sophisticated equipment—I believe more sophisticated than Hydro has in this work, because they tried to bring in very short term, millisecond bursts of hydro. They produced graphs and so on to prove that there are some very large bursts, but for almost an immeasurably short period of time.

One of the things this farmer alleged is that in the United States, where utilities are privately owned rather than government owned, they answer to a sort of arm's-length electrical code. In this specific instance, he claims that in the

United States, on every quarter of a mile on a rural hydro line, you have to have a ground and you do not have that here, according to this farmer. He thinks that is one of the reasons we have problems with tingle voltage.

Could you or your officials explain the difference between who runs the electrical code here in Ontario as compared to the United States; the allegation being that Hydro is governing itself rather than having an arm's-length system which we generally accept as a better system?

Hon Mr Wong: Before handing you over to Andy Frame, even though I have a degree in physics, you have gone beyond me with this one. On that note, I can hand it over to Andy.

Mr Frame: The Ontario Electrical Safety Code is an operation of Ontario Hydro but there is a Canadian Electrical Code. What Ontario does is adopt, by reference, the Canadian Electrical Code, which is a general code put together by all of the electrical authorities in Canada. They meet in Ottawa under the voluntary jurisdiction of the federal government and the Canadian Electrical Code is written. It is rewritten about every 10 years or so.

The Ontario electrical code first adopts the Canadian Electrical Code, but sometimes with exceptions, and then adds on other things which are pertinent to Ontario. So the Ontario electrical code is the Canadian Electrical Code with modifications and additions.

What is proposed in the act is to give Ontario Hydro wider powers to adopt other codes by reference or adopt other regulations or restrictions by reference.

Let me give you an example. Every municipal hydro utility may have some rules or regulations for its particular utility and it would give Ontario Hydro the ability to adopt the rules or regulations of a particular utility—right here, Toronto Hydro—and to make the regulations and rules of Toronto Hydro part of the Ontario electrical code.

They could adopt part of the Underwriters Electrical Laboratories code in the US. The UEL code is a general code in the US for appliances and how those are tested and used and grounded. The UEL is the Underwriters Electrical Laboratories and is based in Chicago. But each state in the US has an electrical code. The California one is the best known because it is the toughest.

What could happen—I am not saying it is going to happen—is that the proposed changes in the act give Ontario the ability to adopt other codes by reference. Instead of writing them out, they say,

“These sections of this code now apply in Ontario.”

You are right. In the US, the codes are much tougher in some places. That grounding every quarter of a mile you mentioned does not apply in all states. It applies in some areas. In some, they are much looser.

Mr McGuigan: It does not apply in Ontario. Is that correct?

Mr Frame: I do not believe it applies in Ontario. I am not familiar with the code to that detail. But the tingle voltage, as you know, had been a problem for many years until they got some new devices for farmers to install. It was a serious problem. It is the intention to be able to toughen up the code, widen the authority of the code, to in effect have a safer hydro system and really that is what the Ontario electrical code is about: a safe hydro system for all concerned.

Mr McGuigan: You say the code is adopted from the Canadian code. Would that not be made up of utilities similar to Ontario Hydro? We do not have any Edison Electrics in Canada, do we?

Mr Frame: Yes, the code committee is made up of representatives from all of the Canadian electrical utilities, both public and private. Most of them, as you know, are public, but we do have a few privately operated utilities in Canada. They have some representation on this committee.

Ontario Hydro and Hydro-Québec probably carry the bulk of the work because they have the research facilities. Ontario Hydro, as you know, has a major research facility on Kipling Avenue. Hydro-Québec has a major research facility. Those two utilities do the research work and the groundwork, and I guess they have the staff available to devote to it. Other utilities are all part of the Canadian Electrical Code, but then they find that the Canadian Electrical Code cannot be comprehensive for each and every region of Canada. There is a basic code, and then Ontario takes the basic code and writes a few extra things which are needed in Ontario.

Mr McGuigan: That has helped, but I guess the question still in my mind is whether we need a regulatory arm or a code that is arm's-length. Of course, you bring up the question of research facilities that are already in place, and that is a pretty good argument for leaving it the way it is. I think that is something perhaps the minister should look into a little further.

Hon Mr Wong: Thanks for bringing it to my attention.

The Chairman: I would like to thank the minister very much for coming, along with his

taff, to brief the committee and for discussing
these issues with us.

I will adjourn the committee until two o'clock
on Monday 25 September.

The committee adjourned at 1243.

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SELECT COMMITTEE ON ENERGY

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Sullivan, Barbara (Halton Centre L)

Substitution:

Jackson, Cameron (Burlington South PC) for Mr Runciman

Clerk: Deller, Deborah

Staff:

Yeager, Lewis, Research Officer, Legislative Research Service

Witnesses:

From the Ministry of Energy:

Wong, Hon. Robert C., Minister of Energy (Fort York L)

Lam, Jean, Executive Co-ordinator, Liaison and Planning Branch

Frame, Andy, Senior Adviser, Utilities and Operations, Electricity Section

Ciemiega, Edward, Director, Legal Services Branch



Hansard

Official Report of Debates

Legislative Assembly of Ontario

Select Committee on Energy

Power Corporation Amendment Act, 1989



Second Session, 34th Parliament

Monday 25 September 1989

Speaker: Honourable Hugh A. Edighoffer

Clerk of the House: Claude L. DesRosiers

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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Monday 25 September 1989

The committee met at 1409 in room 228.

POWER CORPORATION AMENDMENT ACT, 1989 (continued)

Consideration of Bill 204, An Act to amend the Power Corporation Act.

The Chairman: I call this meeting of the select committee on energy to order. We have a quorum present. We are here to begin our consideration of Bill 204, An Act to amend the Power Corporation Act. Mr Cureatz, did you have something you wanted to bring up with the committee?

Mr Cureatz: Yes. Nothing particularly pertaining to the legislation, but just the committee's structure of work for the next two weeks. My understanding from my own caucus is that with the number of committees sitting, there are a number of conflicts. I will probably be the only Conservative member.

I have slotted my agenda pretty well so that I will be here for most startups and throughout the day. If by chance we have a pressing issue and I just happen not to be here at 10 o'clock or two o'clock, I feel comfortable with your using your discretion, if I have not given you any kind of indication otherwise, to commence, and I should be here shortly.

Save and except next Monday. We have no representation on the standing committee on general government's Bill 119, which is travelling to Ottawa. It was thought we should have some presence felt on that bill, so next Monday—I am not sure if you are starting at two or not—I obviously will not be here at all. I am doubtful if we are going to have a representative.

The Chairman: So it is acceptable if we go ahead at two o'clock next Monday anyway, is that right?

Mr Cureatz: That is correct. My only other conflict would be that possibly Tuesday afternoon I will not be here right at two o'clock, so if the clerk could keep that in mind, I would not want the committee to be held up because of our party, no one showing up and your being delayed and delayed.

The Chairman: Thank you, Mr Cureatz. Anything else any of the members would like to

bring up now before we start with our public testimony? Seeing none, the first witness is Energy Probe. I am wondering if the representative, Mr Poch, could approach. Could you identify yourself for Hansard?

ENERGY PROBE RESEARCH FOUNDATION

Mr Poch: My name is David Poch, on behalf of Energy Probe.

The Chairman: You have an hour to divide as you wish between your presentation and questions from the committee, so I will turn the floor over to you.

Mr Poch: I hope you all have before you a five-page written version of my presentation. I will try not to repeat it, although I do propose to go through my comments in the same order.

I think I should start by saying it is 25 September 1989, and in a little over three months it is going to be 1990. I would have thought there was widespread agreement that the 1990s were going to be the decade of change, the decade when we were going to turn things around, when we were going to give some meaning to Madam Brundtland's insistence, I think on behalf of most of the world, that we start thinking about sustainable development, putting the emphasis on the first word.

I have to say off the top that the Power Corporation Act, amended as it will be if these amendments go through as presently drafted, will be an act of the 1970s; perhaps of the 1950s would be a better way of describing it. It is an act to encourage consumption, it is an act to encourage waste, it is an act to encourage destruction of the environment. I think history has shown us that even where Ontario Hydro is given the opportunity to change its emphasis, to become a conservation utility, as it is sometimes suggested, and even when given encouragement by the minister responsible, it has not done a particularly good job of it.

In my written comments, I refer to Ontario Hydro as being a nuclear-station construction company, and I still believe that is the fairest description. I just represented Energy Probe at the Ontario Energy Board annual hearings on Hydro's rates and spending plans, and the board

agreed that there were a number of ways in which Hydro continues on that path.

The board noted that they are still promoting electricity consumption. They noted that Hydro justifies a long depreciation period, for example, on the heavy water plant, on the assumption that there is going to be another nuclear station in the next little while. They set the level of provisions, the amount they are including in rates this year and each and every year, to deal with nuclear waste based on a formula which includes in it the assumption that there will be waste from another nuclear plant. These are accounting policies which Hydro has defended and convinced its auditors it is reasonable to include.

As the board notes, Hydro just is not doing a great job of setting aggressive targets for conservation, for efficiency enhancement, for improvement on the demand side as opposed to adding supply. They are notably unimaginative when it comes to that. That is not to say that there are not bright and dedicated individuals within Ontario Hydro who are quite committed to that view of the future, but they are not prevailing.

When it comes to purchasing or building new supply, Hydro is a go-getter. They are innovative. They are good at constructing. They find a way to do it. They pay the full shot, of course, with the benefit of a lot of subsidies and advantageous access to capital and shielding from liability for risk and what have you. They go ahead. They build these massive plants. They assume they can write them off over 40 years and assume we will need the power. If we do not, we have seen what they do. They go out and market electricity and encourage us to use the power. Then, of course, they have to build another plant.

On the conservation side, we have not seen that kind of aggressive strategy. They do not want to invest in conservation options unless they are proven beyond a shadow of a doubt. They certainly do not want to pay for all of them, as they do on the supply side. What is the difference between buying a nuclear plant and then making customers pay for it in rates over time, and buying a smart lightbulb and making customers pay for that in their rates over time? After all, they both accomplish the same end.

I do not need to do Amory Lovins's travelling lightbulb presentation. I am sure you have all had the pleasure of it and similar presentations from others. I have presented to two previous incarnations of this committee and I know there are a lot of familiar faces here. You are all familiar with these arguments. Indeed, I do not want to be seen as arguing with you, because I sense from my

reading of the committee's past reports that we all agree. If you take Hydro at its stated word, it agrees.

The times have changed. We should be looking at a least-cost strategy. If we can do it with conservation as well as supply, why not? It is cleaner, it is nicer.

We should be counting the environmental costs. We should be counting the cost of providing Hydro with capital that could otherwise be used by the government, with its advantageous rate, to do any other government service or just to put it into the economy through some other mechanism. We should count all those things. Everyone agrees.

But the bill does not say that. The bill says, basically—the only significant thing in the bill—that we are going to let the minister, with cabinet, enunciate policy from time to time and enter into a memo with Hydro and that is going to be a mandatory requirement on Hydro. It does not say anything about what the minister is going to do with that power. As I will point out later, it is a very restricted power.

When we are trying to evaluate how meaningful these changes are and when we are looking at options about what other things could be done within the confines of the Power Corporation Act, we should not lose track of history.

Ontario Hydro professes to be open-minded about all of this now. We certainly have seen a great deal of encouragement aimed at them from the Ontario Energy Board in its recent report, from agencies like the Electricity Planning Technical Advisory Panel to the Minister of Energy, from the minister's office, from your own reports—a long series of reports and recommendations pushing Hydro in the direction of what, to be concise, we will call least-cost energy services.

On Friday, I opened up the newspaper—there is a copy of this advertisement at the back of what I have handed out—and there was a half- or two-thirds-page ad from Ontario Hydro: "Here's an energy-saving idea you'll hate. An economic slump." There is some fine print here and we can read it. I am sure there is something in this ad about energy efficiency, but anybody who looks at that ad is going to take the same basic message from it: If we cannot provide electricity, we are going to cripple the economy of this province.

1420

Hydro has shown its colours, I think, no more clearly than with this ad. I really encourage you all to read the copy and think about what the message behind this ad is. This is not an ad from

an enlightened utility that understands it can put in place 8,000 megawatts of conservation without causing anybody to sacrifice anything and do it more cost-effectively than their own optimistic estimates of the cost of nuclear power. That is just not consistent with that ad.

Let's please remember that despite the good efforts of the people at Hydro who are trying to encourage conservation—I am sure you will get presentations from some of them here, and they are good people—the utility has not changed its view of the world.

The theme of my presentation is that you cannot rely on a general policy enunciation power to get us to where we need to be to change the direction of Ontario Hydro. I do not propose to make the presentations we have made in the past about dismantling the monopoly or what have you. I am taking as a starting point that we are basically living with the beast as we find it. We have an act, the Power Corporation Act, and a bill to amend it, and I am trying to focus on—I hope I am being helpful to the committee—looking at things that you could realistically do within the confines of that bill.

The first thing I would like to say is that it is vitally important that the committee recognize that the mechanism in the bill, a mandatory policy statement provision, is very constrained. For example, if the minister decides that people are wasting power—and Hydro does not have to earn a healthy return on investment; it does not have to dividend to its owners, the taxpayers, as Hydro-Québec does, although it does so insufficiently—and we want to encourage people to be cautious with their use of electricity, we could do this by increasing the price slowly over time, drawing a dividend out and using that dividend to compensate individuals, so that nobody is hurt, everybody is put in the position of having cash to invest in conservation and everyone gets the right economic signal to switch off their lights. No program in the world from Ontario Hydro is going to be able to encourage me to switch off my light. The only program that will do that will be one that raises the price of power.

If the government decided to do that route, it could not do it with the bill. There are too many specific provisions in the Power Corporation Act which talk about how the utility should go about its business. Hydro would have a duty to resist such a suggestion because the Power Corporation Act just would not allow them to do it.

You have to understand that anything that is specifically dealt with in that act will override a

policy statement from the minister, even a policy statement that is done pursuant to the new act which would include a requirement upon Hydro to observe the policy statement. That is just a basic rule of statutory interpretation.

There are a number of mechanisms which just would not be available to the minister—and maybe that is fine. Maybe we do not want to delegate that kind of authority to the minister. But I think we all need to recognize that this act is not going to come up for revision again next year. This seems to be something that happens maybe every five years, more likely every 10 years, so this is it; this is the occasion.

I think it is no surprise to anybody in this room that we are dealing with an incredibly powerful utility, very large, very politically powerful. It is difficult for a minister, especially a Minister of Energy, who has a relatively small ministry, to steer that corporation. You all sat here helplessly a few years ago with Darlington two thirds complete and everybody agreed: "Gee, it's a shame. We wouldn't have made the same decision again, but the money's sunk and we have to go ahead." I think that was a testament to Hydro's ability to set the agenda.

If you think the minister is going to really be able to control Hydro just by telling it what to do, if you think Hydro is going to change its way of doing business, is going to be incredibly forthcoming with information and present all the options to the minister, is never going to threaten that the lights are going to out, and is always going to do this at a time when the cost of decision-making is low, go ahead. If you have some reservations, if you think Hydro is a large bureaucracy with a lot of inertia, then I think at the very least you have to spell out a few of the basic rules of the game.

Section C of my presentation has some specifics and you can touch on them all, but the first two are the key ones. A lot of these suggestions could be put in as mandatory items, but a lot of them could just go into an act saying that the minister, with the approval of the Lieutenant Governor in Council, can order such-and-such, in which case it would be a supreme section in the act, and unless in direct conflict with another provision, would prevail.

There are two that I think have to be put in as mandatory provisions and they are the first two I list. One simply says what I think we all agree to; that is, that we should be looking at least-cost energy services as the methodology. If it is cheaper to provide for the next factory to be built in Ontario to free up the power, if it is just as

cheap to free up the power for that by putting in place a cost-effective conservation measure elsewhere in the economy as it would be to build the next coal or nuclear plant somewhere in the economy, then we should go with the cheaper one. By cheaper, we mean cheaper, counting all the costs. We will come to that.

I think that was the basic tone—correct me if I am wrong; I hope I am not presuming too much—and I think there was widespread agreement among yourselves or your predecessors on this committee that that is the way to go. We are not talking about sacrifice. We are perhaps talking about an industrial opportunity for Ontario to be a leader in the high-technology field of energy efficiency.

Central to that is the second point, which is the definition of costs. The only way that strategy makes any sense is if you count all the costs. This is where I would like to see the committee make the statement that it is the 1990s and things like environmental impact really do count. That is not just, "Well, it counts this year but it doesn't count next year." That is something important enough that it should be part of the legislation.

The environment should count, social costs should count, economic costs—that is, the worth of the government guarantee, for example, which is being channelled to one opportunity rather than another—should count and risk should count. Intuitively, I am sure everyone would agree that when faced with the decision whether to build a nuclear plant or a coal plant, whoever is going to make that decision is going to say, "Nuclear plants have some risks and some unsolved problems and we know that coal plants emit carbon and acid gas," but unless it is in the act as a cost that has to be counted, there is really no mechanism by which anybody can force Hydro to lay out its analysis and try to implement planning that takes those things into account in an accountable fashion.

If you take anything from my presentation, those would be the two that I would ask you to mull over. Mull over those two, if you would be so kind.

I then go on to list a number of specific items you might want to consider as well, which I think would be positive.

The third item is providing an incentive for pollution reduction. As I am sure many of you know, Hydro has no incentive, other than good corporate citizenship, to emit, for example, less acid gas than the regulations require. I am not suggesting that we eliminate the regulation. What I am suggesting is that if there were a cost

to Hydro—indeed, if there were a cost to everybody in society, but let us start with Hydro because it is supposed to be a crown corporation, a public servant—for emitting pollutants, then when it comes time to budget, it would be very easy on the balance sheet for Hydro to understand what the cost to society is, or something close to what the cost to society is, and if there were a cheap way to reduce emissions further, cheaper than the pollution tax, then Hydro would do it.

1430

You can do that as a tax, which would not require any change to the Power Corporation Act, or you have an opportunity to include it in the Power Corporation Act as a requirement for Ontario Hydro in effect to pay that cost.

I touched on net income and dividend as my example earlier. I would refer you back to the evidence of Dr Berkowitz—I think that was the 1976 committee; sorry, the 1986 committee—where he discussed the cost to society of the way Hydro is misallocating capital.

One of the concerns, and I think a very legitimate concern, with any of these suggestions that would have the effect of raising the price of power is a concern for those who are not in a position to pay the increased price. I think there are a number of mechanisms available to you to alleviate that concern. The one I have suggested here is a companion section that would empower the government in effect to draw the expense out as a dividend and hand it over to individuals. You could do it as a tax credit or deduction if you want it to be income-tested. There would be a number of variations on that. I put that in there just to make it clear. If you wanted to do this, there are ways to do it in a sort of voter-friendly way.

Full-cost pricing is the next heading and that is really the flip side of least-cost planning. You can have least-cost planning from Hydro's perspective without the need for all those costs you have counted to be passed along to the customer in rates, but our view is that it is preferable if you do pass those costs along because, as I say, there is no way you can have a conservation program that encourages me to turn off my lights. The only program that will do that is one based on price. I think that would be a positive thing.

I think it is time to recognize that there is nothing sacred about electricity so that we should be encouraging people to waste it. We have to come to grips with the fact that we are not doing ourselves a favour when we encourage one or two sectors of the economy, such as the aluminum smelting industry, by having give-

away electricity prices. It is not as if the electricity is free. It is not that the subsidies we give to electricity in the form of access to capital are not costing society anything. Most important, it is not that the emissions from those plants are free. I do not want to preach, because I am sure you all agree with me, but the only mechanism we can think of that is going to get that signal out is simply to let the price reflect it.

The sixth point I make is with respect to parallel generation. Again, I think there is widespread agreement that there is a very positive role for small-scale hydraulic and cogeneration, in particular. There are a number of other methods of generation and there may be new ones in the future. All we are suggesting here is to do what is rational. Let's count all the costs when we compare that option with the next Ontario Hydro generator and let's force Hydro to pay that full cost.

The wheeling requirement is simply an adjunct of that. Hydro right now in fact was quite severely criticized for its restrictive wheeling policy. This is the policy that controls when a private generator can in effect rent Hydro's lines to deliver its power to a purchaser that it has a contractual arrangement with. Hydro exercises its monopoly almost completely in this respect. The simple question is, what do they have to fear? Why are they trying to choke this off? They can charge a legitimate amount for their transmission line. They can refuse to transmit the power if they need the line for their own use. The only reason we can see that they are acting like a restrictive monopoly here is to restrain the competition, restrain someone else's generation who is doing it cheaper.

First of all, as a matter of economic policy, it is crazy to restrain something if it can be done cheaper, but we also cannot understand what public policy this serves in giving Hydro this particular advantage.

Hydro has another monopoly power and that is with respect to its regulation of the municipal utilities. It basically sets rates, or has to approve them, and publishes something called a rate book which has basic guidelines for how the rates should be designed. Municipals are required to get Hydro's approval before they can borrow. Most of them also have to get their city council's approval, I should point out.

I think this is another part of the act that is just an outdated provision from a more paternalistic era. There are a lot of municipal utilities that could be innovators on the conservation side. We currently have a proposal before the city of

Toronto where Toronto could embark upon a broad conservation program that did not just look at electricity but looked at a variety of fuel forms, looked at transportation and looked at a lot of things where the municipality is in a particularly good position to deliver the programs.

They would have to be able to charge the cost of the electricity conservation aspects into Toronto Hydro's rates. There is no guarantee that Ontario Hydro would let them, and it would be up to Ontario Hydro. They could simply say no. I think that is a bygone era. There is really no need for that kind of interference. We can leave in the section that Hydro has to be satisfied that municipal utilities will recover their costs, if you are concerned about mismanagement at the municipal utility level, but why curtail opportunities?

The final section of my presentation has to do with accountability to the public. Here is where we run into a problem. Obviously, any kind of regulatory mechanism would require more than amendments to the Power Corporation Act. It would also require, if it was the OEB, for example, amendments to the Ontario Energy Board Act. The government has told us that is the next thing on the agenda, that when it comes to Hydro reform, there are going to be amendments to the Ontario Energy Board Act.

But my reading of the amendments to the Power Corporation Act is that the government has no intention of giving that board regulatory authority. I think there are a number of sections in the Power Corporation Act that are really inconsistent with regulatory authority on the part of the OEB and would have to be changed if that were the government's intention. I think we can assume that they are probably going to bring forward a bill that gives the OEB some greater flexibility in terms of when it holds hearings, what it can investigate and hearings it can instigate itself, but I do not think there is any reason to hope that the government is going to make the OEB a regulator, certainly not a regulator with broad enough authority that it could be a meaningful regulator.

If you let it regulate rates but have no control over Hydro's planning process, over its capital expansion and its construction process, great, then it will keep getting presented with Darlington, needed or not, and what choice does it have? They cannot say, "No, we're not going to let you charge us new rates." It is not like a gas utility where you can force the shareholders to pay their share if they have made a mistake.

That being the case, I just close with the point that it becomes all that much more important that the amendments to this act change the world a little. There should be some concrete amendments that at least in theory can send Hydro on to a better course, a course that I think we all agree upon. I would like to close my comments there, subject to your questions.

The Chairman: Thank you. We have about half an hour. We have some questions from the committee.

Mr Cureatz: Thank you for your brief. As I am a Conservative, as you well know, we have not always seen eye to eye on particular issues. In terms of this specific legislation, certainly I am not being critical of the Liberal administration. As a matter of fact, I think my New Democratic Party colleague and I are appreciative of allowing the bill to come to committee. We were supportive of it in the Legislature, albeit with some criticism. We felt that this kind of opportunity at least allows us to canvass the field a little bit to see what various groups are thinking out there.

Albeit I think I had in the back of my mind what you are thinking, strangely enough, in a political sense it is not too far off from what I am thinking. Actually, the legislation probably is closer to what maybe a liberated Conservative administration would bring in as opposed to the present Liberal administration.

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I am only saying that because previous to the close to five years now that they have been in power, under various select committees there had been continued criticism by the Liberal Party in terms of Ontario Hydro and the relationship between Hydro and the administration. We on our side had been looking for a long time in terms of new and innovative approaches to what they had perceived as a difficult situation when they were in opposition.

Looking at this piece of legislation brings home, to me anyway, some of the areas—I am not saying I am supportive of a number of your particular outlines, and yet by the same token, from a legislative point of view, I would have to say that from the historical background of previous Liberal positions, it would seem that these would be the kind of innovative, hard-line approaches they would be making as opposed to what we see in the bill at the moment which, as I say, would appear to me to be more conducive to a Conservative bill than to a Liberal bill; that is, categorizing in general terms a greater influence by the administration in the affairs of Ontario

Hydro, and yet as the present Treasurer (Mr R. F. Nixon) used to say, it is like nailing jelly to the wall.

It is almost formulating the policy from day to day. Knowing the way Hydro works, I suppose it is more accurately from six-month to six-month time scheduling; maybe at the most a year. If there is any disappointment I have in it, and I give them credit for bringing forward the bill, it is that it is not showing the direction they indicated over the last long time about positive initiatives.

I guess I am being critical because I know that as an opposition member, suddenly you will have an announcement from the Minister of Energy over a particular policy and direction to Ontario Hydro without any forewarning to the general public, and maybe without any kind of consultation and consideration. It just seems to me so out of sync with what has been said in the past, as opposed to what they are bringing in. I mean, to me this is a safe, cautious kind of approach, as opposed to all the rhetoric and talk I had heard over the last long time. I can think as far back as Julian Reed and Vince when he was critic and the like.

More specifically, I am interested in one recent government intervention, just for a reaction. I have had some calls about it already. I have not written to the minister. Oh, yes, I have written to the minister now. I think there was some program from Ontario Hydro and Home Hardware. I turn to the parliamentary assistant to the Minister of Energy. Is it Home Hardware? I do not know. On first blush, I guess the idea is all right in terms of energy efficiency. I forget what the payback was and what not. Yet I did not receive any information. I have been getting calls from private hardware store owners saying, "Where is the application form to fill out so that we might participate?"

I guess it is a bit of a leading question, but goodness knows you can talk well enough. You can answer it in terms of any way you want. You see, it is that kind of approach that I just feel uncomfortable with, that we are going to be getting more of that. Instead of having a Russian five-year or 10-year plan for agriculture—which does not work anyway, but at least you have a plan; you can look at it and say this is the direction I am trying to go in—here we are just saying, "There are going to be decisions made from time to time on which we will have some or lots of say, but what those decisions are we do not know."

I guess the question is, how do you feel about that kind of intervention program by Ontario

hydro, and do you think we should have areas—well, of course, you do—but I will just ask you in terms of areas being specific as you have outlined in your presentation?

Mr Poch: I hasten to point out that I think I share a lot of your concerns. Five-year plans tend to be outdated by the time they are published. They tend to be inflexible and if it does not happen per your plan, you are in trouble.

The principal mechanism that we have always preferred to encourage conservation is not to go out and make a deal with Home Hardware or to buy a particular lightbulb from a particular manufacturer and hand it out, but to give people the right incentive to do what is in their own best interests. It is a philosophy that I am sure the Progressive Conservatives will have no trouble with: simply let the market do a lot of the work for you.

You can only do that if you are prepared to raise the price of power to reflect its true costs. That would be my preference, but I am the first to recognize that it is a politically difficult thing to do, to try to suggest ways it could be done without hurting or being seen to hurt individuals who are not in the position to pay the price, and still get out the signal to people to conserve the rational amount, to treat this precious resource like what it is, a precious resource, to understand when you use it you are destroying the environment to some extent.

So that is our preference. I assume it is a preference you would share. If you cannot do that, then there are ways for the utility to go and buy the conservation that are not terribly distasteful. It is a matter of fine-tuning. The Home Hardware example has difficulty because it may be seen as unfair to other retailers. Fine, then Ontario Hydro should perhaps be giving out the lightbulbs directly or giving people a coupon that they can spend on any efficient lightbulb anywhere they want to buy it. Hydro will reimburse the retailer.

It is really just a question of program design. There are fairer ways and less fair ways to do those things. Hydro should be purchasing, when it does purchase, through an open tender process, so if Pro Hardware thinks it can do a better job than Home Hardware, it has the opportunity to bid on a program, and so on. That is really fine-tuning and it may be that the mechanism of ministerial policy statement can be a mechanism where those shadings of program selection can be influenced. I am assuming Hydro has no strong preference among the three mechanisms I just said.

The bill may well serve to avoid the mistakes, at least what some would consider mistakes that have been made in some of these programs. But we would like to see the market have its role, and I think that we still have to face the fact that Hydro is never going to be heroic about its conservation efforts, not for the foreseeable future. There is an entrenched management at Hydro, an entrenched way of seeing the world, which is a reality. I think that is the challenge for you, that you have to structure something so they have no choice but to come into the 1990s.

I chat with Hydro engineers at hearings and they come to me and they really are worried about the environment. They have kids too and they say to me: "But listen, you know. Tell me how you can be sure that all those people are going to replace that inefficient lightbulb with an efficient one when it burns out and not put in another inefficient one. I am responsible for making sure the lights do not go out."

I turn to them and I say: "Maybe only 80 per cent of the people will replace those lightbulbs. If they have the right incentive, why wouldn't they? Even if only 60 per cent of them replace those lightbulbs, you have 60 per cent of that program in place. What happens when the computer at Darlington shuts down in the middle of winter and we lose four huge plants over the winter peak? That is not exactly a diverse, gradual problem. All of a sudden, you may really be causing the lights to go out."

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I tried wording it a number of ways. They just do not understand that. They have spent their lives with their hands on the switches and it really is a different way of looking at the world to say, "We can have diversity, we can have many, many small things adding up to an option." It is hard for people who are used to engineering megaprojects to wrap their head around that. I guess I have some sympathy for them.

I think that is the reality you have to deal with, that even if we fine-tune Hydro so that its programs do not have these kinds of glitches in them, Hydro is just not going to put the resources behind those programs that it is prepared to put behind system expansion. How do we make them do that? We have suggested a few methodologies or at least statements of principle, in effect, that should be in the act so we can use whatever forums there are to try to force that new way of looking at the world upon the utility.

Mrs Sullivan: I am not going to precede my remarks with a long introduction, Mr Poch. I think many of us were on the select committee

which sat last summer reviewing the DSPS and many of your remarks today have followed very clearly from your presentation then.

I am quite interested in some of the suggestions you make about adding to the cost calculation by including social and environmental costs. I understand that from a conceptual point of view. For the life of me, I do not understand how it could be done practically. I wonder if you could expand on that.

Mr Poch: Whether or not you and I could come up with a methodology, I think it has to be done practically. I think we all recognize we are at that point where we cannot say, "Gee, this is tough, so let's not do it." I sense from your question that you very much want to do it, if you can, and I certainly do.

It may not be possible with any degree of certainty to reduce environmental impacts to dollar figures. Some of these social costs we can reduce to dollar figures. Risk is an obvious one. Markets and insurance companies do those evaluations every day. Economic cost of capital is another easy one. Markets do that every day too. There are lots of people with expertise out there who can evaluate those costs.

Pollution is not as easy, but there are some proxies. For example, we can look at what Hydro is currently spending at the margin to abate acid gas emissions to meet the limit. When the Ministry of the Environment proposed regulations for sulphur dioxide emission limits and presented them to its minister and the minister presented them to the Legislature, it had spent some considerable amount of time talking with Ontario Hydro. They understood what it would cost to meet those regulations.

Somehow the machinery of government was able to reach a conclusion that it was worth it to do it, that that last tonne that gets abated is worth however many thousands of dollars that last abatement measure costs per tonne. So I think prices are getting set for these things, but the trouble is the next tonne that gets emitted, the one that is not caught by the regulation. No one is saying the obvious: If it was worth \$1,000 to stop the last tonne, why is it not worth \$1,000 to avoid the next one? Why do we not give, in effect, a \$1,000 debit to this option per tonne when we are looking at future plans or give a \$1,000 credit to conservation, whatever it may be? I think there are proxies for these things.

I do not think anyone pretends that there are any absolutes, but at least by saying that they have to try to make those comparisons we would be quite far ahead of where we are now. We had a

nuclear costing inquiry which did not look at social costs, which did not look at environmental costs despite EPTAP and the committee's concerns in those regards.

We have Hydro coming forward with demand supply options studies and demand-supply planning strategies. They have a chart saying, "This one is better than that one." That is it. There are a lot of things in there that could be quantified but more important I think, is simply that the legislation would spell out that these are to be taken into account as mandatory. However you can do it, effectively or ineffectively, you have to take a stab at it.

You know it is easy today for me to be an advocate of conservation because I can come before you and I can go on David Suzuki's television program and hold up a lightbulb and say, "In Ontario, in the commercial sector alone by the year 2000, we could wipe out the need for two large reactors or four large coal plants just by upgrading commercial lighting to the state-of-the-art cost effectively."

We all agree that is great. What happens in the year 2000 when we have used that one up? Now I am reasonably confident that we will find some new smart lightbulbs, but we may not. Maybe the next generation of smart lightbulbs will be just as expensive as a nuclear plant or a coal plant or whatever. What then? Right now, there is nothing telling Hydro that all else being equal, you should go for the clean one.

I think that the public is certainly clear on that one, that if it is at all close, go for the nice stuff. So I guess that is what I am trying to say. If you can get that message into the legislation, it would be a good starting point. I readily agree with you that it is not easy, but after all that is what we pay all those environmental studies and economics people to do. That will be their problem.

Mr Charlton: I will not drag the committee back through our past discussions on all these issues. Suffice it to say that you understand the large areas of agreement that we have and the couple of small areas of difference. In general, I feel quite comfortable with your presentation. I am somewhat disappointed, though, in its emphasis.

I will just quickly try and run you through that so you can comment and perhaps help focus my concern for the committee. I certainly do not disagree, as you have said, with the least-cost energy services concept. If we put it in the act, how do we then measure that we are getting it every year?

Mr Poch: Let me stop you there and go to the section of my presentation where I talk about accountability. The act has no accountability mechanism. I do not know that one can be put in it. It would be nice if the amendments in this act allowed for the opportunity for other acts to import that accountability. We really do need some kind of independent appraisal, some arbitrator we could go before.

I was just trying to accept the reality that that would not be under this act; that would probably be under, let's say, the Ontario Energy Board Act, if it was to be the Ontario Energy Board. I just wanted to point out, though, that the way the bill is drafted it does not contemplate that and it probably excludes it. So yes, I readily agree with you that there is no enforcement there.

Mr Charlton: I understand what you did and why you did it. If you, for example, followed the second reading debate in the Legislature—I guess it was in June—that was the focus of the debate. I would just like to see that focus continue and not get lost. I do not want to lose the opportunity to talk about the bill and any changes we may make to the bill to make it better. But I do not think we should miss the point that the bill itself, as it presently exists and even with all of the changes to the bill you have proposed, will mean very little without some regulatory mechanisms in place to ensure that what is in the act is being delivered.

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Mr Poch: I cannot agree with you more. I would say two things: First, even if you went for the full pricing system proposed here and imposed all the dividend requirements, the pollution tax requirements and all that, so that you optimized things for the market to do its own work, this committee knows full well that that would not be enough because there are all kinds of problems and other institutional barriers. The split-incentive problem is a very good example of where it is really a market failure.

There is still a need for some regulatory mechanisms or crown programs to overcome those barriers. I think, trying to be more realistic, assuming that all these changes are not included, that we do not have electricity at full cost so we are not going to get the market to do the work for us, then it is all that much more important that we have a regulatory framework which can force Hydro to act as a better proxy for the public's will. So I agree wholeheartedly.

Mr McGuigan: David—since you and I are probably the two oldest ones here, I will call you David.

Mr Poch: I feel that way.

Mr McGuigan: I have been on the committee since 1977 and I have enjoyed it very much. Donald MacDonald was the chairman when I first came on.

I liked your presentation. The problem is in implementing it. I guess our friend Sam Cureatz has mentioned the difference from being in opposition. I was in opposition eight years and was part of that criticism, but we all realize it is a little different when you have the responsibility of implementing it.

I just want to point out and see what your reaction is to the suggestion that we let the market do it or we put it in a position where the market does it. I have to agree that it works. All you have to do is look at the Mideast war back in 1973, the oil embargo and so on and what we have done in the meantime in making things more fuel-efficient, although we are still burning as much oil as we ever were because we are burning it in twice as many vehicles.

Mr Poch: The economy has grown.

Mr McGuigan: We are getting better mileage on vehicles, but we are running twice as many vehicles. Picking out Hydro as the one area where we are going to put strict market rules and looking at so many other areas where governments are involved with things to do with their citizens—I guess as an example we are just having it brought to our attention about Via Rail.

Every trip that a citizen takes on Via Rail, according to the government of Canada, and I got a letter from Mr Bouchard on this, costs the government \$100 and it only recovers at the fare box or at the wicket one third of the cost of your trip. So if you take a trip where you pay \$50—a round trip from Chatham to Toronto is \$50 for me—it costs the government another \$100 for that trip. Airplanes return two thirds; that is still one third that is not returned. I do not know what the figures are on people driving on the highways. You get different arguments.

What I want to point out is that governments in many, many ways subsidize various industries to try and make that industry viable in their community. You mentioned aluminum. Do we have any aluminum smelters in Ontario?

Mr Poch: That is really the Quebec example, I guess.

Mr McGuigan: But it could apply in Ontario if we had aluminum. On the opposite side of that, we favour steel in Ontario, because it is manufactured in Hamilton and Sault Ste Marie. We favour steel in our legislation and our

purchases, in our policies, because it is a homegrown product. I think you can probably find many more example where we do this: the western family subsidizing the movement of grain on the railroads, because grain is—

Mr Poch: Undoubtedly governments, certainly in Canada, are in the business of subsidizing an awful lot of things. I guess we are not going to change the way—well, maybe Mr Mulroney will change some of that. If I can try to answer your concern, I think it is a question of recognizing two things: first, that there is no such thing as government subsidizing. It is all of us subsidizing; that money obviously gets charged into our taxes or into our environment or what have you.

Given that there is a cost to encouraging this behaviour, given that it encourages use and abuse of that resource or service or what have you, we have to ask: Are the social benefits outweighed by the costs? It is simply our position that when it comes to electricity, given the incredible capital intensity, given the inflexibility of the large plans, given the pollution and the risk they create, we think we can no longer pretend that the next one is going to be a Niagara Falls and that it is worth encouraging because we have some natural advantage.

I do not think we have that natural advantage there any more. We are fooling ourselves to try to lever it, and we are destroying ourselves, I think, in the process. I know that the latest edition of *Electric Power in Canada* is out, and I was just looking at the energy intensity of different nations. It continues to amaze me how economies that we would like to emulate in many ways, like Japan, have very expensive electricity, and they are much more effective per unit of gross domestic product than we are at utilizing that energy.

I am not saying that government subsidies in general are illegitimate. I think you can argue, with Via Rail, with those kinds of infrastructures, that while admittedly those subsidies encourage waste and there is a cost to that, those are part of what makes us a nation, that they have particular regional development implications which are in effect a conscious cross-subsidy that they government is creating.

I think the problem is that with electricity we have a historical set of cross-subsidies set up where we are subsidizing smokestack industries at the expense of home owners and renters. If the government could start with a clean slate, I do not think that is something it would necessarily do now. Those are not the growth sectors, those are not the nice sectors in terms of the environment.

Canada seems to be orienting itself towards a service-oriented economy. We want to sell our intelligence in the world market, so drawing resources out of the economy to subsidize big electricity users and wastefulness of that resource I think is an example of one of those subsidies that may have made sense back at the time of Niagara Falls, but I think it is one you probably would not do again if you had a clean slate.

I readily admit that we do not have a clean slate. I understand the political constraints you have to work under, but I guess that is my response, really, that there are subsidies and there are subsidies.

Mr McGuigan: Have we time for a further question?

The Chairman: A very brief one. We have one more questioner.

Mr McGuigan: You bring up a very interesting point about subsidizing smokestacks as compared to owners and renters. In Japan I understand they have variable interest rates depending upon the industry you are in. I looked a bit at this because of agriculture, with less ability to pay those rates than other industries. I have to ask myself the question, and through myself to you: Can you think of the uproar there would be if we charged industry less—it seems to me that is what we would have to do to keep it competitive with our competitive countries—than we charge a home owner? I just cannot imagine how we would ever—

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Mr Poch: For electricity or for capital?

Mr McGuigan: Either one.

Mr Poch: We are doing that. That is what we are doing with cheap electricity rates, it seems to me: We are taxing everybody and giving it to industry, so we are exporting that subsidy along with the product in the name of remaining competitive on the export market. I think there are much more targeted ways we could remain competitive in the export market that maybe would not be politically unacceptable. We have a whole range of things, some of which presumably you cannot do under free trade any more, like export credits, tariff protections and all kinds of trade mechanisms that can be targeted, and general fiscal policy, which seems to me is maybe better suited.

Meanwhile, I am concerned that we do not lose track of the fact that when we choose to subsidize electricity, we are doing this kind of subsidy in a very untargeted way. We are subsidizing the losers along with the winners, so

we are crippling ourself, too, in that export competitiveness arena. Subsidizing electricity is not a good proxy for subsidizing exports or subsidizing social welfare or what have you. There are a lot better, more targeted mechanisms, and I guess that is really all I am suggesting. I am no expert on trade protectionism, but I gather there is a wealth of mechanisms there.

Mr McGuigan: Just one final comment. There are not many we can get away with any more, with free trade.

Mr Poch: I think it is important to recognize: We have a minimum wage law in Canada because we have decided we want to protect workers, so we understand that means there is going to be a flight of some capital in labour-intensive industries to Mexico or where have you. So be it. We have decided we are just not going to bear the social cost of trying to be competitive in those areas. Trying to be competitive in the resource sector, for example, if the cost is the destruction of the environment, it is another area where Canadians would say, "Listen, if we can't compete by doing it rationally and cleanly, then maybe we don't want to compete."

The Chairman: We have time for one brief question.

Mr Brown: Thank you. I was interested in your comments on wheeling. I had asked some questions about this in the last committee hearings. I guess what concerns me is that what you are really saying is that if electricity was a commodity like others where you can trade it all over the place, there is a certain market value for producing that electricity and you should be able to get that wherever you are. That is really what you are saying there.

Mr Poch: Yes. I say that because I am concerned that right now all the nice things have to compete against it, so it would be healthy for that price to rise.

Mr Brown: At least one of the problems I see with that is that you would be perhaps encouraging NIMBYism: We would have the pollution here but we would have the energy being sold somewhere else; because as you say, no matter what source of energy you have there is some risk to it, there is some pollution; something happens no matter how you generate it.

Mr Poch: I guess I should clarify. My comments were actually aimed at wheeling within Ontario as opposed to wheeling for the export market. I agree, it is more commonly discussed in that context. In fact, Energy Probe

has a little cogenerator now sitting in its basement that is not running yet, but when it gets up and running, if we can produce power cheaper than Hydro can, right now Hydro would have every right not to let us sell it to somebody down the street. They can just abuse their monopoly, keep the competition out. One of the ways they do that is by restricting access to the grid.

All I was calling for is that we treat the electricity grid the same way we now treat telephone wires, the roads, the rail and everything else, that it is a common carrier. It is a natural monopoly, and it makes sense, but it should be regulated as a natural monopoly, that one party should not be able to favour its own generating division at the expense of another generator when it comes to access to that natural monopoly.

Mr Brown: I understand that, but I guess what is running through my head is: If we look at that as Hydro being a small generator on a continent of big generators, why should it not be able to do the same thing? Getting back to your point of talking about supplying the dividend back to society and having a world price for electricity, if there is such an animal, why should we not do that? Is it not the same thing, whether you do it between two individual companies in the same province or you do it between different utilities on the same continent?

Mr Poch: Arguably, if we have some natural advantage and we can produce electricity more cheaply and cleanly than someone else, yes, it is a wealth that this province has and we probably want to sell some of it off and make some money. I strongly resist Hydro's export efforts to date, because it is selling it off below cost. Every time we send a kilowatt-hour across the border, we are giving away two trees, half a lake and a certain amount of the government's capital borrowing power, and we are not charging them for it.

So yes, if we had full-cost pricing, all costs accounted, it would be hard for me to object, at least on that basis, to an open border in terms of electricity. It would be like any other commodity. Right now, I object strenuously because not only are we giving away our natural resources but we are cutting our own throats in the manufacturing sector. All we are doing is subsidizing electricity south of the border so that they can produce widgets more cheaply than we do, and widget companies suffer too.

Mr McGuigan: I have a supplementary.

The Chairman: Just a very brief one, please.

Mr McGuigan: It is just to quarrel, actually, with your last statement about our not charging

the Americans. Perhaps we do not charge them the full price, in your view, but we do charge them a higher rate than we charge our own people, so at least we are recovering some of those social and environmental costs. We charge them more than we charge ourselves.

Mr Poch: Sometimes we do, and that is one of the protections this act would offer, but since we price electricity so low ourselves, because we do not pretend to try to collect those costs domestically, saying we have to charge more in the export market is a very marginal protection. We have no assurance we are collecting all the costs; far from it.

I would argue that the history is we are not coming close. In fact, I did a calculation at one point of what I spoke of earlier, the imputed costs of acid gas emissions; if you took what it costs to abate per tonne and then said it was worth at least that much to us in terms of the destruction of the environment, and I multiplied that number times the number of tonnes of coal or acid gas that was being emitted on account of export sales.

This was a number of years ago. It turned out that one externality that had not been counted ate up all the supposed profit. Then, of course, there are any number of costs associated with exports that are not counted. So yes, the pricing floor of domestic prices that is in the amendment is some safeguard, but not much of one.

The Chairman: Thank you, Mr Poch, for coming and speaking to us this afternoon. You seem to have engendered a fairly lively discussion. We have gone over time here. Thank you for coming in.

Mr Poch: Thank you very much.

The Chairman: Our next witness this afternoon is the Ontario Hydro Employees' Union, CUPE Local 1000. I am wondering if the members of that delegation could come forward, please. Could you introduce yourselves for the benefit of Hansard, please?

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ONTARIO HYDRO EMPLOYEES' UNION,
CUPE LOCAL 1000

Mr MacDonald: My name is Jack MacDonald. I am the president of CUPE Local 1000. I represent all the Hydro workers in the province.

Mr Murphy: I am John Murphy. I am the vice-president of Local 1000 from the same union.

Mr Menard: My name is Bob Menard. I am the education and publicity officer with Local 1000.

The Chairman: Thank you. You have approximately one hour for the presentation. It is yours to divide as you wish, although it is very useful if you can leave some time for the members of the committee to ask you questions. We have been handed a copy of the presentation.

Mr MacDonald: Just quickly before I start, there are two minor corrections. If you could go to page 3 of the brief, the first sentence where it refers to appendix III, that should be appendix II. At the bottom of the second last line of the second paragraph, it refers to appendix IV. That should be appendix III.

As I mentioned, we represent CUPE Local 1000, which represents some 18,000 unionized people who work for Ontario Hydro. Our people cover every aspect of operation and maintenance of the electrical grid system. It is not our intention to try to bypass discussions with Ontario Hydro on some of these issues that we would like to raise, but we have raised a couple of these issues in a letter to Premier Peterson. We felt very strongly that we seem to have been bypassed, for some reason, in the proposed changes to the Power Corporation Act. A couple of those revisions, we believe, infringe on our collective agreement. As late as last week we became aware of some of this, through our own fault perhaps, but we have made a hurried attempt to try to get some of our thoughts together to present to you at this time.

We have four major issues we would like to talk to you about: the changes that refer to cogeneration, the encouragement of Ontario Hydro to get involved in financing cogeneration; the references to changes in the Power Corporation Act that would have an impact on our pension plan; the changes to the Power Corporation Act relative to increasing the board of directors—we would like to talk to that issue as well; also, an issue that is not covered directly in the proposed changes—a recent announcement of the government relative to the export of tritium troubles us very much and we are very much involved in that and we would like to discuss that with you.

To start off, we would like to deal with privatizing Ontario Hydro. With recommendation 1 is John Murphy.

Mr Murphy: Recommendation 1: Considering the increased costs and other adverse effects of privatizing electrical generation in Ontario, the Power Corporation Act amendments dealing with increased private sector involvement in electrical generation should be removed.

Specifically, we are dealing with subsections 56h(2), (3) and (4). Many of the changes to the Power Corporation Act appear to be in response to criticisms that Ontario Hydro is out of control. As the primary bargaining agent, we have experienced some of the corporation's excesses. In 1985 CUPE 1000 fought a 12-day strike over the issue of contracting out because of the negative impact on our members and the power consumers of Ontario. Past experience shows that private industry is a poor choice for the construction and maintenance of Hydro's generating and distribution system.

Now the government is proposing legislative changes that will lead to more problems from a quality and efficiency perspective and to more labour conflict, to the detriment of the Ontario consumer.

As a principle, governments should not knowingly interfere with free collective bargaining relationships. Unfortunately, the creation of a legislated mandate for Hydro to privatize its operations through parallel generation incentives leaves us no doubt that somewhere down the road CUPE 1000 negotiators will face a Hydro bargaining committee that will use these amendments as its reason and mandate for giving work typically performed by CUPE 1000 to the private sector, beginning yet another direct attack on our bargaining rights. A recent study by the CUPE 1000 contracting-out committee indicates that this challenge to our jurisdiction has already begun.

The issue of cost has also to be considered. Ontario Hydro benefits from various economies of scale that cannot be matched by small independent operations. The corporation is already under criticism for not buying electricity from independent producers at a cost higher than Hydro's costs to produce its own.

Combined with the lack of expertise the private sector has in the electrical generation industry, the additional cost of having to effectively subsidize the electricity produced by paying more than it is worth makes privatization a bad deal and one that CUPE 1000 wholeheartedly opposes. It is our firm belief that utilities should be run by the public for the public with no thought of privatization.

Mr MacDonald: As John mentioned, we do not intend to go through the appendices. They are there for your information. One of the statements made in the last sentence of the first paragraph related to problems that we have foreseen, and in our study on contracting out, we saw a marked increase in accidents when contractors were

used, especially in some of the line work and forestry work. We contend they were not properly trained and that resulted in some pretty severe accidents.

I would contend that people can perhaps undercut costs by working in this fashion, but that is not the true long-range cost when it results in personal injury. I happened to work in a couple of stations with Hydro. The first couple of stations, where they used turnkey operation and contracting to build stations such as Thunder Bay and Atikokan, were simply a disaster. The technology did not exist out in the community, unfortunately, for whatever reason and, as a result, there were a lot of serious errors and cost overruns.

I talked to the president of Hydro because we were very much concerned with cogeneration. It seems to be a new fad. I do not believe it will ever come to the point where it takes over any large portion of the generation, but the problem I see is that Hydro is being asked to pay more for that power than it presently sells the power to its customers for. That does not make any sense to me. I know Hydro has been approached by people who are interested in building large generation, provided the cost they would receive for the power would be at a level considerably higher than the consumer is paying for it in Ontario now.

The second issue we want to cover is the issue of pensions. CUPE 1000's right to negotiate all aspects of the pension plan issue should be recognized in the amendments. I think this was the oversight we spoke about because the amendments call for taking the pension plan out of statute and allowing Hydro to make rules, rather than seeking orders in council to bring about changes in the regulations that govern the pension plan.

We have ended up in the court system in Ontario, and the Ontario Supreme Court by unanimous decision ruled that Hydro was at fault, and in fact did not comply with the Power Corporation Act, specifically section 24, which calls for it to pay in for the current cost of liabilities. Hydro has now taken the position that it is challenging that before the Supreme Court of Canada. We contend that they will lose there as well. It was a unanimous decision of the court of Ontario on an Ontario statute. We believe that it is improper and I do not believe they will receive leave to appeal.

This is a very important issue to us, naturally. If Hydro could simply have and apply for an amendment to the Power Corporation Act that

would effectively take it out of statute, it would bypass that whole court decision. They would be able effectively to do an end run around and not comply with the existing court award and possibly have the same situation in the future.

The one other aspect these amendments to the pension plan call for would be a change in the pension plan to allow Hydro to set up more than one pension plan. Currently, all regular Hydro employees, with the exception of casual construction employees, belong to the one pension plan that is covered by the Power Corporation Act. We have in our collective agreement the sole right to negotiate the pension plan. We also have a commitment in the collective agreement that Hydro will not seek an order in council to change the pension plan without mutual consent.

I believe that, again, these changes to the act are just applied for on purpose to get around these contractual commitments. To create an additional pension plan—normally I would not disagree with Hydro having as many pension plans as it likes, but I think you have to understand the membership of these plans and the way they operate. A lot of the Hydro employees that come through our membership also end up in management and therefore it is of some advantage to have people all on the same pension plan so there is some continuity. They would not have to change pension plans midway through their employment with Ontario Hydro.

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The difficulty is that if you ever do try to split up a pension plan, you have to try to split it up in a fair manner. Naturally, in any pension plan, you have the liabilities in the fund; you also have the assets in the fund. There is a real imbalance, if you like, when you look at this. What happens with our members who stay our members is that they become Hydro employees, they pay into the pension plan on more or less a flat basis and their liability is more or less determined very early in their career.

What happens to so many management people is that for some strange reason they get rapid promotions in the last few years of employment and the liability for those people increase dramatically in the last few years of employment. This is not true for union members who are more or less stuck in the same employment classification and wage rate. If we were ever to split up this pension plan in a fair fashion, it would have to be split up on the basis of contributions, not on the basis of liabilities. If you look at the contributions versus the liabilities, you will see very much of an imbalance.

When we heard of these proposed changes of the Power Corporation Act, we wrote to Ontario Hydro and took the position that, first, taking it out of statute and allowing Hydro to make rules rather than seeking orders in council would be all right with us, provided Hydro inserted some protection in our collective agreement in the form of adding to the clause that states it will not seek an order in council without our mutual consent. They have now agreed to put in the words that they will not seek an order in council or make rules without our mutual consent. That does seem to take care of that one situation.

But in the same letter in which the Hydro people agreed to that, they said that they disagreed that they would have to have any discussion with us prior to setting up another pension plan because the only concern should be that they protect the benefits earned. That is precisely what the court ruled on, and we included as one of the appendices the court award and some statements made by some very prominent justices in this province on that matter. Certainly what they are saying is that Hydro does not have right to ownership of that fund and therefore it cannot rely on a statement that as long as it protects the benefits, we should not care what happens with the fund itself and whether Hydro sets up another plan.

The other issue with the pension plan that we have taken—and it rolls in slightly to the other concern we have about the board of directors—is that we have challenged Hydro's board of directors and we are now seeking legal opinion because we believe that the structure of the board of directors of Ontario Hydro is really in violation of the intent of the trustees of a pension plan. Certainly the board of directors of Ontario Hydro have some very serious responsibilities, running the corporation and so on, and we see them as being distinctly different from the responsibilities of being a pension plan trustee. If you are a pension plan trustee, your responsibilities are to act in a prudent fashion in the best manner possible for the plan members.

What the board of directors of Ontario Hydro did in fact was make a financial decision. They developed and accepted a financial plan to use the surplus in the pension plan to downgrade their operation, maintenance and administration budget. In other words, if they did not have to pay into the pension plan as prescribed by section 24 of the Power Corporation Act and they used the surplus funds, they could downgrade their budget for all those years until that surplus disappeared.

In actual fact, the surplus now that they have used is rolled up to be approximately \$500 million and, at the same time, we have developed a further \$800-million surplus in the fund. I contend that they are not going to have the right to take any of that out.

We have sought legal opinion on whether there is a conflict of interest between the board of trustees, being the same people who are on the board of directors of Ontario Hydro, and the pension plan. We believe that may be true, especially when you consider that some of directors on the board are in fact in the law firms that are getting the benefit of fighting these court cases. It seems to be a strange coincidence.

Another coincidence concerns their actuaries. They terminated the actuaries that worked for them for years and they have hired another actuarial firm that seems to have quite an interest in the ongoing operation of the pension plan, now that they have been selected to be the ongoing actuaries of the plan.

In another area, the proposed change would possibly increase the board of directors from 10 to 14. We believe, because of all the concerns we have had with the existing board of directors, that it would be wise, and we wrote to Premier Peterson asking that they consider the appointment of further labour representation on the board of directors of Ontario Hydro. When we look up and down at the names of the board of directors, there seems to be a distinct interest there for a number of them in the operation of Hydro. There seems to be a lot of business flowing their way, and we believe that might be in conflict with the real purpose of it.

We believe that labour has a lot to add in this area. We believe we are well aware of many of the operations of Ontario Hydro. When we say labour representation, we are not saying particularly from our union but somebody with a labour sense. We are not particularly happy with the one who is there now, but that is another story. We would ask you to consider seriously, when the government is looking at adding to the board of directors, that it look at some labour-based people who could add a different perspective that might help Ontario Hydro very much.

The last issue we want to talk to you about is the announcement that came out of the government not too long ago. I see that Ontario Hydro's paper has come out—I am sure you have all seen it—that talks about the sale of tritium getting the green light. We have copies of that here if any of you would like to see that.

We are very much concerned about this area because it deals with the health and safety of our people. I have been directly involved because I sit on the Ontario Federation of Labour energy committee and I am also currently on a task force of the Canadian Labour Congress. We are touring Canada. We started out in Vancouver and toured out to the east coast to Saint John, trying to get input from various environmental and labour groups and so on across the country regarding the whole nuclear fuel cycle.

Certainly I can say that consistently across the country the major concern is the nuclear program, the possibility of it adding to the weaponry of the world, if you like—and we do not support that view. We are solidly in support of the nuclear program in Ontario Hydro, but we also believe that the sale of tritium should be very much restricted to use in Canada.

I was invited to a little soiree out at Buttonville Airport one night where some people were putting on a show for people to set up some remote heliport and airport sites lit up by tritium. They certainly would add greatly to the health care of some of the people in northern communities; it would allow access and so on. We certainly support that. When I found out the lights were manufactured by an American enterprise, I was not very happy with that.

I will let John explain the tritium policy we developed as a local. The purpose was to try to convince other labour groups not to be so critical of the nuclear program in Ontario, but to take a different view of it. It appears that Ontario Hydro and the government did not buy our policy. John, do you want to go into that?

1540

Mr Murphy: Just a little bit of background, first of all, as to why we decided it was necessary to develop a policy: For a number of years we had been lobbying Ontario Hydro very, very hard to have the tritium, which is a radioactive isotope and builds up to greater concentrations within nuclear reactors, removed.

We wanted it removed for two reasons: first, in regard to the workers we represent who work in those nuclear plants, the occupational exposure to radiation that these workers would receive would be less if in fact the tritium was removed; second, most of us who work in those nuclear facilities also live in the communities surrounding those facilities. We also recognize that by getting the tritium out, the environmental emissions would be less and consequently the impact on the environment would be less. So there were two reasons: to protect the workers and to protect

the environment. That is why it was necessary for us to develop a policy.

We also clearly understood that tritium is an essential ingredient in the triggering device of nuclear weapons. So in our bid to get Ontario Hydro to extract the tritium for those two reasons that I outlined, we recognized that there would be groups that would be concerned about that because of the potential use that tritium could be put to. We had to try and balance the two. We said yes, we want the tritium out, but we also have to be pretty clear what we want to happen with the tritium when it comes out.

The position that we took was very, very simply that we do not ever want to be part of a process that could directly or indirectly contribute to the nuclear arms race, and selling tritium to the United States, no matter what monitoring techniques are put into place, essentially does that. Because the tritium that is sold to the United States will, if not directly end up in nuclear weapons, free up other tritium that can then be used in the arms race. The detriment that that has for us and for our members is that that is the final link that can then be made between nuclear reactors in Canada and the nuclear arms race.

The reason that we believe one of the main reasons why the Candu system and why nuclear power have been acceptable to people in the province of Ontario is that there has not been that connection before, that we do not use enriched uranium and the tritium has not been used for any nuclear purposes. That was a major concern to us, not getting that tie between the two.

The second reason is a very, very good business reason, we believe. The business reason is simply, as Jack has outlined, that there is growing amount of good uses, for want of a better word, for the sale of tritium, things like emergency exit signs, runway lights, medical research, and a big application of tritium is going to be as fuel for fusion research.

We have this resource here in Ontario and it is extremely rare and very, very expensive. If we have this product here in Ontario, then we could be not only keeping ourselves out of the whole question of the arms race by restricting the sale of tritium to sale within Canada, but also in fact be making a very, very smart business decision by doing that.

There are companies that want to get into medical research for using the applications of tritium or making those runway signs or exit signs or getting into fusion research, which would produce thousands of jobs in this province. Having that material restricted, that product

restricted to Ontario, to sale within Canada, would encourage those international companies to come in and set up business here in Canada. We felt, as Canadians, that was good and something that we should certainly be encouraging to be done.

The last comment I would like to make is on the question of fusion research. Fusion, hopefully within the next 30 or 40 years, is going to be a reality. It would be a lot less of a nasty product than the fission reactors that we have right now. There is, as we understand, an international consortium set up to decide the location of the first commercial research facility. As I said, it would involve a lot of money and a lot of jobs.

The number one choice of the group right now that selected a location was in East Germany and that was unacceptable to the Americans. The number two choice, as we understand, is Canada. Having the tritium available, because it is going to be an essential ingredient, would vastly increase Canada's opportunity of having that facility set up here in Canada.

I would really urge you to look very, very seriously when we are dealing with changes to the Power Corporation Act at an amendment. Not dealing with tritium, I think, could really be to all a detriment. It is a really good opportunity to do something good not just for us but for the generations that are going to come after us.

Mr MacDonald: One other thing I would like to add on tritium. In our discussions with other groups, certainly the transportation of tritium in Ontario has been very much a concern for a lot of people throughout the province. Our position and the policy we took is that we believe tritium extraction facilities should be built on all the nuclear sites so that the transportation of tritium will not be a problem for anybody. We continue to support that position.

That is a quick coverage of the four areas we wanted to cover with you. If there are any questions, we would be glad to try to entertain them.

Mrs Sullivan: I have not heard Local 1000 before this committee in the past but I have heard representatives from your group in front of another committee. I have always found your presentations very thoughtful and really quite interesting. Today's is very interesting because it covers such a range of topics that we can really spend a lot of time on each one.

I would like to spend a little bit of the time, although we could as I say go everywhere, talking about your views and the position the

local has taken on parallel generation, private generation and cogeneration.

One of the thing that has struck me is that indeed much of the capacity that Ontario Hydro will benefit from in private generation is basically from sources that would not be economical for Hydro to develop on its own, whether it is small hydro or solar or indeed some of the cogeneration projects, although in some of the cogeneration projects it could be feasible for Ontario Hydro to proceed.

It strikes me that if the private sector was not a participant in the development of some of those other places, there would not be development, particularly the small hydro and perhaps some of the more experimental wind and solar and so on.

One of the things that was raised—I guess it was Mr MacDonald who suggested it—related to the safety concerns, the increased number of accidents and so on. One of the other things that strikes me—my understanding actually is that in a lot of the small generation that is under way now the expertise is coming from ex-Hydro employees who have gained their experience at Hydro, from the experience and safety information that has come to them through their participation with Hydro.

Second, when you are looking at cogeneration projects, you are looking at extremely technical and sophisticated equipment that is being built by internationally respected companies that are operating in Canada and, frankly, I am not certain about your conclusions about the number of accidents, the safety records and so on. It seems to me that Westinghouse, for example, as one of the manufacturers of turbine generators that are used in a cogeneration process, has an equivalent amount of expertise in that area to a division of Hydro.

You are going to give me a response to that, I hope, but I wanted to raise those things because I am a little uneasy with some of the conclusions that you have come to about the kind of competition that might exist, say, for membership if that is a matter of concern or for the expertise of people who are already involved in Hydro.

The other thing that I wanted to clarify is that some of us were a bit taken aback in your discussion of the board of directors. I believe, Mr MacDonald, some of us heard you say that some of the board members were benefiting by their association, as members of the board, through Hydro contract or something. I hope that was not what you intended to say and I wondered if you could clarify that.

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Mr MacDonald: I do not know where I start. First, when I talked about accidents I was referring to not precisely cogeneration; what I was referring to is a contracting-out report that John Murphy—the appendix to our report also. We found that in certain areas of Hydro where it tended to put a lot of its business out to private enterprise, if you like, we had a very increased rate of accidents. This was, I think I mentioned, primarily in the forestry and line trade, where people were doing it with safety perhaps not being in mind, making a few dollars, with perhaps not as modern equipment and as good work methods. Clearly that happened.

The reason I mentioned this is that we were trying very much in Ontario Hydro to improve the safety record. We had a number of fatalities each year for a number of years and some very serious accidents; fatality in the line trade and some very serious accidents in the forestry trade. Until this year, for two years running we did not have a fatality. Unfortunately, this past little while, we just had another one. Those things do happen, and we are doing everything to prevent it.

We found that with contractors and people working using these shortcut methods and so on, and being awarded contracts because of this, it was developing some poor working habits within our own people as well. We are very much concerned with that. That was not related directly to the cogeneration, because the amount of cogeneration that exists you can add up on a pretty short list. The cogeneration that has always existed, and I worked in thermal generation for a number of years with Hydro as well as in hydraulic generation, the amount that used to exist of any magnitude at all was such as paper mills and so on that sold their secondary power off to Ontario Hydro.

During those years when they did that, of course what they did was bought secondary power from Ontario Hydro in off-peak periods, and there was a power rate structure that made it more beneficial at times for them to shut down their own generation and buy at off-peak periods from Ontario Hydro. I do not understand the rate structure now. I am not involved in that, but I understand that has backed off considerably.

When you say that people could develop economically small cogeneration projects and hydraulic cheaper than Ontario Hydro, I find that hard to believe. I find that Ontario Hydro has got out of some of these very small generating plants. They have either automated them or have got out

of them entirely because they are, in a lot of cases, a very serious environmental problem. The cost to make them safe to the environment would be immense.

You do not run a little hydraulic generating station or a brand-new one without having a lot of thought put into the environment. Are you backflooding lands? How are you controlling watersheds, the erosion and so on? It is very much a concern. I am certainly not an expert in that, but I believe that people who are pursuing cogeneration as a major source of power in this province are going in the wrong direction and wasting a lot of money.

I am not saying there is not the expertise out there, but that expertise costs money. Normally speaking, when I talked about private generation, or private enterprise such as the Thunder Bay steam plant that I worked in, when they had a \$60-million or \$70-million or \$100-million overrun because of some design faults, failures, inexperience on the part of the engineering companies that were building them, I was very much concerned with that.

Mrs Sullivan: Surely you are not saying that, for example, the Boise Cascade project is uneconomic and a foolish way to approach the generation of both electricity and steam for that operation?

Mr MacDonald: The paper industry in Ontario has had a long experience in producing and running steam turbines for the processing of paper products and also, as a byproduct, producing power. But for a number of years, also when I worked in Thunder Bay, the pulp and paper stations up there that had generation and used to operate it had it shut down for a long time because they ran into severe environmental problems with discharge and so on. The fact of the matter is that it was cheaper to buy the power from Hydro in those days. Now, that was a few years ago.

Mr Murphy: I think the important message we want to get across is that we recognize that there is an important mix. We believe that a healthy mix exists right now with what we have. What we are concerned about is that because of the perceived—I stress “perceived”—advantages of privatization, people could start to believe that by moving a greater proportion of the generation over to the private sector, somehow it is going to be done cheaper and more effectively or whatever.

Obviously we have a concern about the people we represent, but setting that aside, we have a concern that right now we have Ontario Hydro,

which is a world-class renowned utility. Why start fixing something that is not broken? We really believe that if we shift in that direction, we could lose our world-class status, that effectiveness we have. Right now the whole direction in Ontario Hydro is not profit. The whole drive is towards quality service, a reliable, high-class quality service which satisfies the consumer, the industry and keeps jobs in Ontario. We are concerned that a shift away from that is going to have negative repercussions, that it is going to be very shortsighted, focusing on perceived advantages of privatization. That is really what we are coming after. We are saying that there is not a need to shift that mix.

Mr MacDonald: I would like to comment on your other question about the board of directors; I am not sure I remember the entire question. I commented on the board of directors, because, as I said at the outset, we were seeking legal advice in the matter of whether in fact there is a direct conflict of interest of the Hydro board of directors acting as a board of directors of Hydro and also acting as the trustees of the pension plan.

As trustees of the pension plan, you are supposed to do everything to ensure that the plan operates solely for the plan members and not for financing Ontario Hydro's other ventures, such as operation, maintenance, and administration budgets. We are checking into that.

The other comment I made is that I found it strange that the decision to challenge this, the Ontario Supreme Court decision in the federal court system—I am sure the decision was ultimately made by the Hydro board of directors. They are protecting their own behinds, I guess, because they made the original decision that was ruled to be wrong, but then they turn around and use the law firm whose member sits on the board of directors. I do not know; I am not saying that is a conflict of interest, I just find it rather strange. There seem to be other connections where certain situations are pursued where there seems to be a flow of money in that direction.

Mr McGuigan: I see those charges as very serious charges. I do not think they should be made without giving us the names of the people involved. As a member of this committee, charged with the business of looking at Hydro, I do not think I can sit here and hear such charges without knowing who these people are.

Mr MacDonald: First of all, we are not asking you to pursue them. I said we were seeking some legal advice on whether or not it constitutes. We are giving you the layman's view of what

appens. We have been fighting this pension case in the courts for over three years now.

Mr McGuigan: If I could just interrupt, I have no problem with the pension—

The Chairman: I would like to point out that while members enjoy parliamentary immunity, witnesses do not. We are discussing a question of reputation, and I think the witnesses did say they were looking into it. I would just like the witnesses to fully understand that they do not enjoy parliamentary immunity for things said before this committee.

Mr MacDonald: That is right. I did not mention any individuals.

The Chairman: That is right, but I thought it might be useful just to say that.

Mr MacDonald: Thank you for your advice.

Mr McGuigan: I take it from that that we are not going to get the names of the individuals.

Mr MacDonald: It does not seem like it would be a good idea.

Mr McGuigan: I just want to register that I object to those things being made unless names are provided.

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The Chairman: Do you have any further questions, Mr McGuigan?

Mr McGuigan: I have a concern about private operations. Some two or three years ago in this committee we had, I remember it was, a father and son who took over an existing dam. They rebuilt this dam and got into power production. As I recall the case, the key to it really was that they did it as a family operation. Even so, they were not making great profits, but they were making ends meet and they were making a reasonable salary out of it.

It seems that what I hear you saying is that we really should have an entirely closed shop within the whole development system and that these people should not be allowed to use their ingenuity, their family labour and their own resources to provide a very small amount of power, but nevertheless power, for the people of Ontario, for the people who are consumers.

I have no quarrel with labour unions and closed shops within their systems. It does bother me a bit to hear what I think I hear you saying, which is that we should have an entirely closed shop as far as generation is concerned.

Mr MacDonald: I would like to comment on that, because certainly we have never had a closed shop and that is not the intention. Certainly there have been industries in Ontario

that, as a secondary part of their industries, have produced power for their own use and have sold some power to Ontario Hydro. That is on the larger scale. There have been some small municipalities that have had, perhaps from the beginning of time, I do not know, some small generation to supply power to the township. Ultimately, if the town expanded beyond the capacity of that generation, then they started buying from Hydro.

Mr McGuigan: Orillia is a good example.

Mr MacDonald: Yes; certainly there are a number of those situations. We are not attacking those situations. What we are saying, though, is that we believe—in fact, we heard hundreds of rumours that private industry—the gas company was going to buy the Hearn plant and produce generation. A private consortium was going to build a nuclear station in Ontario.

I can tell you that when I was out in Saskatchewan, the biggest concern the people who came to talk to us had, whether they were the academics in the universities or the environmentalists, was that the Saskatchewan government was thinking about giving permission for a private company—in fact, a company that would be owned outside this country—to build and operate a nuclear station in that province. That was something that caused an awful lot of concern there, and certainly if we were looking at that sort of thing here. I am not talking about closed shop; I am talking about being 100 per cent opposed to that as a Canadian and as an Ontarian.

Mr McGuigan: I would share your same concerns if private enterprise wanted to put up a nuclear station, I am sure. Coming back to the father and son situation, it seemed to me that you were striking at them, too. I just wanted to say that I really did not favour that.

Mr MacDonald: I am a little concerned that people could be misled into thinking that that could be a viable enterprise for them to get into. The odd person who might have taken over a small, outdated generation station or something and worked hard to put it back into operation—that is a possibility, but I would suggest that is an exception. I think people would be misled if they thought they could, on a very small scale, build a generating station.

Unless Hydro is going to subsidize the cost of that power eventually, I do not think they could make it viable. Certainly the advantage people have, if they can sell it to Hydro, is that they do not have to concern themselves with the distribution network. I guess it would depend on the

price they received for the product right from their station, or how they hooked into the system. I think those small exceptions we are talking about here are not of much concern to us.

Mr McGuigan: Thank you.

The Chairman: Are there further questions?

Mr Charlton: I think I understand in basic terms where you were coming from in your comments about the pension amendments. I was a bit confused at the end of that part of the presentation. I thought I understood you to say that part of the pension issue had been resolved by this letter of agreement with Hydro, but part of it was still a concern?

Mr MacDonald: Yes.

Mr Charlton: Can you set out for us in specific terms which section you see that concern in and what words we need to change to protect you?

Mr MacDonald: The section in the proposed changes that dealt with Hydro operating more than one pension plan: It would be a change to section 20 of the Power Corporation Act. It is under section 12 of the amendments. Unfortunately, I am referring to two documents here; I was referring to the document which is the explanatory notes and on the explanatory notes it is section 12, but in the actual Power Corporation Act I believe it would be under section 20.

Mr Charlton: Yes, that is correct.

Mr MacDonald: But in the explanatory notes under section 12, it says: "The corporation is authorized to establish other pension plans in addition to the Ontario Hydro pension and insurance plan."

Mr Charlton: Yes.

Mr MacDonald: That is a concern we had. I made input to the Rowan Task Force on the Investment of Public Sector Pension Funds that looked into all these pensions and whether we take the pension plan out of statutes and so on; I went into that. But the concern I have here, as I

tried to explain, and I tried to explain in my letter to Ontario Hydro, is that I believe it would be necessary, if that ever came about, and if this amendment is going to go through, that some protection be built in there to make sure the assets were divided in a fashion that was according to contributions rather than to liability.

Mr Charlton: What the section says now is the corporation may establish other pension plans in addition to the Ontario Hydro pension and insurance plan. If we were to consider an amendment which simply said that any resulting impact on the Ontario Hydro pension and insurance plan would be subject to negotiation with, is that the kind of protection you are looking for?

Mr MacDonald: That is precisely what we asked from Ontario Hydro. They were rather protective. In their court case, their direction is, "We only have to guarantee you the benefits, so we're guaranteeing you the benefits. We're not going to talk to you about other pension plans. We can divide the pension plan funds as we like as long as we guarantee the benefits," and that is absolutely wrong. That is not what the court award said at all.

Mr Charlton: Okay. That makes it clear in terms of what you are looking for here. Thank you.

The Chairman: Are there any further questions? Mr MacDonald, then, we very much appreciate your coming in, testifying before us and giving us the benefits of your thoughts on this legislation. Thank you for coming in.

Mr MacDonald: Thank you and I hope you will peruse the rest of our document.

The Chairman: That is the last witness for today, members of the committee. I am wondering if I could ask members of the steering committee to stay behind.

The committee adjourned at 1610.

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MacDonald, Jack, President

Murphy, John, Second Vice-President

Menard, Bob, Education and Publicity Officer



Hansard

Official Report of Debates

Legislative Assembly of Ontario

Select Committee on Energy

Power Corporation Amendment Act, 1989



Second Session, 34th Parliament

Tuesday 26 September 1989

Speaker: Honourable Hugh A. Edighoffer
Clerk of the House: Claude L. DesRosiers

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Contents of the proceedings reported in this issue of Hansard appears at the back together with a list of the members of the committee and other members and witnesses taking part.

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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Tuesday, 26 September 1989

The committee met at 1010 in room 228.

POWER CORPORATION AMENDMENT ACT, 1989 (continued)

Consideration of Bill 204, An Act to amend the Power Corporation Act.

The Chairman: Could I call the committee to order? Our first witness today is Stephen Probyn. Mr Probyn, would you come forward and make a formal introduction of yourself for the benefit of Hansard?

Committee members, I believe a document has been handed around from Mr Probyn. Is this your presentation?

Mr Probyn: That is right.

The Chairman: It has just been handed out to you. There are two.

Mr Probyn: Yes, there are two. One of them is the text of my remarks and the other is a series of amendments that I would invite you to consider.

The Chairman: All right. Perhaps you could then introduce yourself for Hansard.

ENSERVE FINANCIAL CORP

Mr Probyn: My name is Stephen Probyn. I am delighted to be invited back before your committee as it considers the Power Corporation Amendment Act, 1989.

I believe this bill represents an excellent step in the direction of restructuring Ontario's electrical supply industry. Although I would probably go further on some aspects of policy, I applaud what has been put forward by the government. I have just three amendments for your consideration.

My first amendment would place a general obligation on Ontario Hydro for environmental protection. Specifically, it would require Hydro to assess the hidden environmental costs of its actions and incorporate these into its planning process, much as it considers other costs of investment and operations.

My second amendment would enable Hydro to use price as an incentive to develop the independent power sector, along with other instruments such as loans and technical assistance.

Third, I suggest that you delete the challenge to the free trade agreement in section 30 of the bill.

Before going into more detail on these proposals, I would just like to tell you a bit about my credentials so that you will know where I am coming from.

I am the president of Enserve Financial Corp, an investment firm registered with the Ontario Securities Commission. Our principal activity is the development of project financing structures for corporations wishing to finance independent power projects. Currently, we are involved in projects in Canada ranging in size from \$50 million to \$1 billion. These projects are technologically diverse and include wood energy, waste-to-energy, coal-water fuels, small hydro, large hydro and nuclear.

Geographically, although a Toronto company, we are active across Canada, from Cape Breton Island to the Columbia River in British Columbia. In addition to independent power, Enserve also advises clients on infrastructure projects and through that activity we are involved in a number of major infrastructure initiatives taking place in the Toronto area.

I should mention at this juncture that for Enserve, as a company operating in a private sector environment, we are finding substantially more of our business outside of Ontario than inside it. This may be a reflection of our clients' particular orientations. It may also be an indicator of trends present in the industry today as it evolves towards a more mature structure.

I am impressed by the enthusiasm with which the government of Ontario has embraced independent power and the ambitious targets it has set for our province in this regard. I am less certain that the means to the end we seek—a commitment of 2000 megawatts by the year 2000—are yet in place. This is not necessarily a failing of government. I think I reflect an industry consensus when I tell you that the Honourable Robert Wong was seen as one of the most progressive Energy ministers of the last decade and that we have great hopes for his successor, the Honourable Lyn McLeod.

However, the plain fact of the matter is that it is extremely difficult to develop a parallel generation project in Ontario today. Why should

that be, with the enthusiasm which decision-makers such as yourselves, Mrs McLeod and even the chairman of Ontario Hydro have brought to the subject? Mr Franklin, in an article published in the *Financial Post* on 7 June of this year, responded to one of my columns in that journal, saying, "We are depending on them (the private power sector) to produce a sizeable amount of electricity by the year 2000."

The reason why there is the enthusiasm for private power is also explained by Mr Franklin in the same article. He says, "If growth continues at just 2.7 per cent per year, all of Hydro's generating stations will be working at full capacity by 1994." If our current rapid growth does not moderate, we may reach the full capacity danger zone far earlier than that.

However, Mr Franklin went on in the article to let slip, in my view, the reason why, in the face of great expectations, little appears to be materializing. He said, "Hydro uses a 'blended cost' of nuclear, thermal and combustion turbine generation to reach the current avoided cost that ranges between three cents and four cents per kilowatt-hour, escalating at the rate of inflation for the duration of the contract." Three or four cents is simply not enough to make a large-scale independent power industry viable. It is not even close.

It is not enough in the United States where the industry is well established. Enserve's clients include one of the largest engineering companies in the world, as well as one of the largest private utility groups in the United States. Both of these corporations are major players in an industry which is now the largest single source of new electrical capacity in America. Both own and operate several major projects in various regions in the United States.

Looking through that window, I do not see many projects where economics justify development at much under five cents per kilowatt-hour, and that is in US dollars. In general, projects in this category would tend to be waste-to-energy plants, where low power prices are compensated by a substantial revenue stream from tipping fees. Otherwise, except where there is an outstanding inherent advantage to a particular proposal, such as a pre-existing dam on a river, the US independent power industry would wither and die in an environment where it received under three US cents per kilowatt-hour for their product.

Does this mean that the US industry is not only less efficient than public power in Canada but grotesquely so? Or that their environmental regulation is more onerous than ours by an order

of magnitude? What is going on here that there should be such a vast difference in the cost structures of power generation north and south of the border?

In my view, it is not the realities that are worlds apart, although there are significant differences; it is that, as often is the case, they do not translate very well to each other. I should point that this applies only to conventional plant—US nuclear is, for a variety of regulatory and technical reasons, very much more costly than its Canadian counterpart.

The difficulty in translating public power into economics which makes sense to private generators was the theme of my article to which Mr Franklin responded. The expressions used, "such and such per kilowatt-hour avoided cost," sound the same, but in reality their meanings are quite different. A crown corporation, which is not taxable, except in certain fairly rare circumstances, simply has a completely different way of calculating its cost structures from a public company.

The Ontario Nuclear Cost Inquiry itself recognized this point and alluded to the principal difficulty in making the translation. The inquiry stated:

"The panel believes that there are several valid reasons for the apparent differences, the principal one being that the costs projected by Hydro are levelized costs expressed in terms of 1988 constant dollars with interest at about 4.5 per cent per annum, whereas US costs are more likely to be reported by utilities as current accounting unit energy costs with interest at 10 to 15 per cent."

It seems to me that a critical aspect of the Power Corporation Amendment Act you are now deliberating upon must be the question of whether it will facilitate the translation of public power accounting into private sector economics.

My reading of this bill is that it does largely accomplish the task of providing a legislative instrument to bring about the new era of private sector participation in the electric power sector that we seek. The bill seeks to increase the accountability of Ontario Hydro to the government. It will be the job of the Minister of Energy to put into effect the transition to this new era through specific instructions to the board of Ontario Hydro, entrenched in memoranda of understandings. Ministerial accountability is generally to be desired in a democracy and certainly any steps in that direction should be applauded.

There is, however, a higher level of accountability. That is to the Legislature. Today, there is

an increasing trend towards legislation which does not embody policy but merely provides a mechanism for ministerial discretion. Obviously the complexity of modern life implies ministers must have a degree of freedom to manoeuvre. However, if legislation does not set policy, then there is no real test of accountability for programs carried out by the executive.

1020

In the case of the Power Corporation Act, I believe that the Legislature should delineate policy direction in certain key areas. The most important of these is the environment.

I would like to suggest an amendment to the act which would state Hydro's mandate to protect environmental quality. Under the amendment you have before you, Hydro would not only have a duty to protect the environment but would also have to take into account the environmental costs of a project. Many of these are what economists call externalities. These are the hidden costs of pollution. They are important costs, possibly of far more significance than the money we spend on our Hydro bills. Usually they are the costs that we hand on to our children.

A prime example of this problem is the acid gas impact of power purchases from the United States. I would like to read a short passage from the Ontario Energy Board report, HR 18:

"Hydro's position is that for 1990 the principal control measures not already utilized are a further reduction in secondary sales, and increased purchases from US fossil-fuelled generation stations. However, Hydro views the curtailment of secondary sales as the least desirable option for purposes of meeting acid gas emission limits. Therefore in 1990, when Hydro will apparently be hard pressed to remain below the regulatory limits, it will have to rely to a greater extent on purchases from US fossil-fuelled generators."

The board continued:

"In the board's view, the strategy, while it may comply with the letter of the law, ignores the spirit and intent of the legislated acid gas emission limits. Whether acid gas emissions are produced in the United States or Ontario matters little to the environment in Ontario. The damage done is substantially the same."

That may be true to you or me or the Ontario Energy Board, but let's consider the position of Ontario Hydro. Ontario Hydro, as an organization, must ensure that its generation meets certain standards regarding acid gas emissions. Hydro is not responsible for Niagara Mohawk or the New York Power Authority. The sources of power imports are not scrutinized by an environmental

assessment panel; it would have no jurisdiction in the United States. Ontario Hydro does not have a mandate to protect the environment, except in the sense that it must deal with the constraints imposed by environmental laws of general application.

Hydro's mandate, in fact, is clearly spelled out in the act. Section 56 reads, "The purposes and business of the corporation shall include the generation, transmission, distribution, supply, sale and use of power," etc. To that purpose have been added other purposes, such as energy conservation, and this present bill proposes to add others, including the promotion of parallel generation. But nowhere that I can see is there a specific reference in the act giving Hydro a positive charge to protect the environment as compared to the negative constraints contained in various provincial and federal acts and regulations.

What is the impact of this lack of positive policy direction? Let's look at OEB's HR 18 report again:

"Finally, the board is both surprised and disappointed that Hydro is not relying more on its energy management programs and nonutility generation (NUGs) as important present and future components of acid gas emission strategy."

Why the surprise? From the utility's point of view, it is acting perfectly rationally when it uses imported power as a measure for meeting its acid gas reduction targets. Suppose that nonutility generation was half a cent more expensive than imported power. What justification would exist for using it? Under the current act, none.

That is why we have to provide Hydro with a clear mandate from the Legislature that it shares with all of us a responsibility for the environment and that its role must be to work towards a better, cleaner environment by counting the environmental costs as real and evaluating it in the manner it evaluates all other costs.

My second suggested amendment concerns the incentive policy for the development of the independent power sector. As I indicated earlier, there is a real problem in the translation of the language of public power into a viable environment for the private sector. This is less concerned with the actual cost of power produced under either regime and more a matter of the way in which such items as interest costs are fed into Hydro's avoided-cost formulas.

As the bill stands, it allows the corporation to make loans and provide incentives and technical assistance to independent generation projects. This approach of giving out low-interest loans

and other incentives is characteristic of a number of recent projects and appears to be the main engine for developing parallel generation beyond the level which the low avoided-cost prices can support.

While in theory the provision of incentives and loans can offset some of the dampening effect of the avoided-cost policy, in fact they are no substitute for realistic pricing. In an environment where every project is a result of a complex deal, it is difficult for market participants to gauge opportunities through clear market signals. Where there is a known pricing structure which provides opportunities for a return, entrepreneurs will make the independent power industry vital and dynamic.

Today, however, we have a different story. The signal to the market is an avoided-cost pricing policy which is in most cases insufficient to justify investment. Through a long and arduous negotiation process it may be possible to increase the return to an acceptable level, but then again it may not. What current policy is forcing the entrepreneur to do is to start out with a sow's ear and make it into a silk purse. But if there are other more attractive opportunities in the marketplace, how many will try?

The suggested amendment puts pricing policy in the arsenal of incentives to develop the industry. Under this provision, the corporation will be empowered to set incentive prices to encourage the growth of parallel generation. This will release Ontario Hydro from the straitjacket of the avoided-cost methodology and will enable a better translation of the accounting methodology of public power into the economic realities of public power. Combined with the ministerial power of direction found in section 8 of the act, this provides an important tool for the development of the independent power sector.

Finally, I would like to turn to the question of the US-Canada free trade agreement as it relates to this bill. My third proposed amendment would delete section 30 from the bill.

My primary concern here is not the rights and wrongs of free trade, but the climate of uncertainty which an attack on federal jurisdiction contained in this bill represents. In using vital legislation as a soapbox, we risk legal challenges which could throw into question the entire act.

Section 30 of this bill amends the act to allow power sales outside of Canada only to the extent that "the price to be charged for that supply of power will recover the appropriate share of the costs incurred in Ontario and be more than the

price charged to customers in Canada for equivalent service." I would underline those last two lines.

Furthermore, the bill also mandates the Ontario Energy Board to "ensure that the requirements for power of Ontario customers and any requirements for power under contracts with other customers in Canada are met before meeting the requirements for power of an customer outside Canada."

There is little question that these provisions potentially violate the free trade agreement and are intrusive into federal power in interprovincial and international trade. For example, article 90 of the treaty specifically prohibits the kind of discriminatory pricing envisioned in clause 30(1a)(b) of the bill.

The passage of this section of the bill is likely to be regarded by Canada's critics in Washington—and I note in passing today that the Premier (Mr Peterson) is in Washington making a plea for acid rain reduction—as a backdoor method for renegeing on key energy provisions in the free trade agreement. Although it has little immediate impact on the energy trade, it may have a chilling effect on future exports of energy from any province, not simply Ontario.

Coal-state advocates and congressmen will have in this provision evidence that America cannot place full trust in the treaty. Pressures to resist Canadian power imports as less reliable than US domestic sources are already strong. The language of this part of the bill adds fuel to that fire.

To the extent that we manage to assist our opponents in Washington to build a case against Canadian power imports, we hurt ourselves. Prebuilding power resources for exports is an important economic development tool for a number of provinces, including Nova Scotia, New Brunswick, Quebec, Manitoba and British Columbia. I should mention that one of the projects I am involved in is a power export project in British Columbia. In the case of BC, the free trade agreement puts British Columbia on the same footing as US utilities outside the Pacific Northwest for the purposes of wheeling power through the Bonneville Power Administration.

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The power sector can mean literally thousands of jobs across Canada, many of them in poorer regions. These are skilled jobs in the construction and operation of sophisticated power plants and transmission facilities, not make-work. Ontario, which is unlikely to be an exporter of firm power

for some time to come, may be seen as a spoiler by other regions if this amendment is passed. It is not an image that I, for one, would relish.

This brings to a close my statement on the Power Corporation Act. I urge the committee to approve the bill with, of course, amendments which reflect the concerns I and others have raised.

I thank the select committee for taking the time to listen to my views on the bill before you. I would be delighted to answer any questions.

The Chairman: We have about 20 minutes for questions.

Mrs Sullivan: Mr Probyn, I found your brief very interesting and indeed pertinent. There are a couple of questions I want to ask, particularly related to the amendment you have put forward on the environmental protection mandate.

Yesterday, we had Mr Poch from Energy Probe appearing before us and I asked him his point of view about including the costs of environmental protection as part of the analysis of the overall costs of generation. It is very much like yours. I asked him how that could be done. He said, indeed, there is no methodology that exists and he was not sure; it was a good idea but really was not a very practical approach. You seem to have thought more about the methodology and I would like to know what your views of that response are.

Mr Probyn: The United States Office of Technology Assessment has done substantial work in the identification of environmental costs, at least as far as I am aware. There are some costs which are actually not quantifiable, but there are a great many costs which can be quantified. The congressional budget office, through the acid rain debate, made a number of attempts to quantify the costs of acid rain, for example.

Mrs Sullivan: Is that not in retrospect rather than in looking ahead into the future?

Mr Probyn: If you have done it in retrospect and you have an estimate, for example, of the number of tonnes of SO_2 that you are going to emit from a particular power station, that gives you an idea of the environmental costs.

In terms of nuclear waste disposal, there is a substantial body of work that has been done over the past 20 years by the National Research Council and Atomic Energy of Canada Ltd at the Whiteshell facility that quantifies environmental costs in that area.

One of the aspects that one has to realize about any cost numbers—and I deal with this all the time as somebody whose business involves financial

projections of power plants—is that they are all stabs at a great unknown. There are all sorts of people who are bankrupt but whose computer models of four or five years ago show them making enormous profit; for example, natural gas costs. Ontario Hydro has a way of quantifying natural gas costs which escalate them at a certain rate.

When I was at the Department of Energy, Mines and Resources we did a review of 20 energy forecasts from about 1980 to 1984. They all had one thing in common: they were all wrong. There was not even one that was right by accident. You would expect, the odds of probability being what they are, that somebody would at least get it right by accident. I personally do not think environmental costs are significantly more difficult to quantify than the costs that are quantified every day in projections relating to fuel prices, capital costs, labour costs, etc., or in projecting the costs of power stations—for example, Darlington B, which will not be completed until significantly after the end of the century. How do we know what Darlington B is going to cost in the year 2010? We can make projections.

My point is that there should be an attempt to quantify the costs. A lot of the costs are quantifiable. Some of them obviously are not. We have to live with that. We live in an uncertain world; we do not live in a computer world.

Mrs Sullivan: If I could just, once again, stay with the same amendment that you proposed: I am not convinced, and I am going to look at this again, that indeed the first two sections of your amendment are required. But with the emphasis on parallel generation, where do you see the private power generator in terms of the private sector's obligation, first of all, to include environmental costs in its calculations and, second, to conduct its operations in an environmentally sensitive manner?

Mr Probyn: I think the private sector should have exactly the same obligations in this regard as Ontario Hydro. Many of the private sector's technologies—and they will be enforced largely through environmental regulation—are environmentally benign. Gas-fired cogeneration and water power are often benign, but they are not all that way. They all have to be subject to scrutiny. On that point, I think we have to develop mechanisms which provide an expeditious but thorough scrutiny of private sector projects on environmental grounds. I could not agree with you more.

Mr Charlton: I would like to pursue with you just for a few moments the concerns you have expressed about avoided cost and your suggested approach to a solution in an amendment to allow for incentive pricing, as I do not exactly understand how that is going to resolve the problem. If we cannot negotiate an avoided cost with Hydro that will create an incentive for the private sector entrepreneurs to develop a private power industry but we give Hydro the authority to use incentive pricing, is it not just going to set the incentive pricing at roughly the same level as it is now setting its avoided costs?

Mr Probyn: I guess it depends on the approach, actually the sort of mindset, that Hydro has. I am taking Mr Franklin at his word. He says he wants a lot of independent power to bridge the gap between now and the coming on stream of the next nuclear project.

If one does that and talks to Hydro officials, they are in a straitjacket that is self-imposed, I suspect, to a large degree. There is no mandate in legislative terms to get themselves into this straitjacket, but they are saying, "We do our numbers and then we come up with a lifetime unit energy cost." That lifetime unit energy cost actually has a real interest rate. I am not sure if any of the witnesses have talked about Hydro's real interest rate, which is four per cent over four years. Put that into the numbers: "Gee, power is too cheap to meter. I'm sorry; we'd really love to give you more for your power but we can't."

Mr Charlton: I guess what you have just said to me is that the real solution is in the directions that Hydro gets and not in whether the act says avoided cost or incentive pricing.

Mr Probyn: What I am saying is that it is two steps. You have the ability to provide incentive pricing and then you have the ministerial direction, "We need higher prices."

Mr Charlton: I agree with you in terms of what the problem is but, for example, you use the quote in here of Franklin's where he talks about the blended price. Hydro's rationale for currently using the blended price as avoided cost is that at this instant it does not need any power, at the same time as it is saying, out of the other side of its mouth, that by 1994 we may run out.

We have to come to terms with that question of whether we are talking in terms of avoided cost or incentive price. What I am saying to you is that as long as Hydro is in the mindset and has no other direction, if it does not need power at this instant, its incentive price is going to be 3.79 cents per kilowatt-hour or its avoided cost is going to be

3.79 cents per kilowatt-hour, whichever term you use in the act.

The minute they are short, and therefore have to consider the next supply option, avoided cost will be the cost of that supply option on the margin by itself. There lies the answer, as I see it in how we in this act give the government the responsibility for deciding when the margin cost is the required cost. In my view, it is right now based on what Hydro is telling us the future holds for us, but that has to be a political decision, not the corporate decision because it has a book to balance.

1040

Mr Probyn: Precisely, and that is exactly what I think my amendment is almost a consequential amendment to enable the minister—

Mr Charlton: I guess what I am saying is it seems to still leave the authority with Hydro. That is my problem with your amendments.

Mr Probyn: I guess I am hoping that the minister will make the required direction to get the whole thing kick-started.

Mr Charlton: You would have no problem with that was our approach in the act?

Mr Probyn: No, absolutely not, if there was a mandate for the minister to proceed. Again, it gets back to this whole question of trying to remove some of the ministerial discretion and allow the Legislature to speak to the question.

Mr McGuigan: Like all of us, I share your concerns about the environment, but I have a little bit of a problem about the overall thrust whether it should be directed specifically at Hydro to cost in all the environmental costs or whether it should be overall legislation that all sources of energy have to take into account.

Hydro, in my mind, is probably one of the better sources of energy as it treats the environment, because at least in the thermal plants you do have good combustion conditions as compared to coal which you might burn in your furnace under poor combustion conditions. In directing it to Hydro, what I am afraid of is that you are tilting the end use perhaps to worse polluters than Hydro and that in the overall mix you are giving Hydro a drag on its economic performance which is not being put on other people, and the end result could be tilting us to the use of more polluting sources of power, such as wood, coal and fuel oil.

Mr Probyn: I guess what I am saying is not that one would relent on one's other avenue of approach; for example, dealing with the pollution problem posed by automobiles, which is at

important and growing problem. Certainly there is no doubt in my mind that we have to deal with it, and obviously in Mr Bradley's mind as well. Take one of my projects, for example. It goes through the Environmental Protection Act process and has to demonstrate that it is environmentally acceptable. Because I am an entrant with a specific project, there is an onus on me to prove that my project meets environmental standards.

Hydro has a similar onus on all of its new projects, but it is an enormous balancing act between all sorts of energy sources, between United States coal, Manitoba hydro and Lakeview and Pickering, the hydraulic stations. What I am saying is that the Legislature should say to Hydro, "When you guys are striking that balance, you have to have the environment in mind."

I do not regard this as being somehow critical of Hydro. I agree with you that Hydro has an excellent record on pollution, but what it does when it is making a decision—and having worked in government I know the way a bureaucracy works. Let's face it; a bureaucracy looks at the fact and says: "Here's our mandate or here's what the minister has told us to do. If we go beyond that, we're sticking our necks out and we have no mandate to do that."

Putting this amendment or an amendment similar to it into the Power Corporation Act will say, "You guys also have to look at the environmental implications of what you're doing." That will give them the opportunity to consider environmental costs that today they might not be able to consider. I think the case I cited, which the Ontario Energy Board cited, of importing US fossil-fuel power to reduce its own acid gas emission levels is an absolute classic, and the way you can deal with that is a positive charge, "Okay, guys, environment is your responsibility as well as all of the rest of us."

Mr McGuigan: That is a good answer. I guess the agreement that Hydro has, with the memorandum of understanding it has signed to meet the environmental requirements, you do not consider that going far enough?

Mr Probyn: I would say first of all that I think it is important for the Legislature to express a mandate for environmental protection. Second, the acid gas memorandum says, "You, as a bureaucratic institution, limit your acid gas emissions." It is important, and I certainly would not deny its importance. I think it is an excellent piece of regulation, but it does not say, "You guys have the mandate to consider Ontario's environment in the way you operate." That is all.

It is a question of nuance, but I think it is important and I think the case the OEB brought to light really does illustrate why it is important.

Mr McGuigan: More as a matter of curiosity than relating actually to your brief, you say that, for a variety of regulatory and technical reasons, the US nuclear is much more costly than Canadian. Can you, in a short period, give us a little bit of insight into that?

Mr Probyn: Yes. The problem of US nuclear, in its regulatory terms, has been twofold. First of all, since Three Mile Island there have been a number of changes in nuclear plant design brought forward by the Atomic Energy Commission. Each time they were brought forward they were applied to plants already under construction, so out goes the reactor vessel, in comes the new one, put in more concrete, whatever they had to do. That was enormously costly. We did not have that situation, because of course Candu is a completely different design.

The second thing is that US environmental regulation gives access to the courts by environmentalists. In fact, I put pen to paper on this. There is a sort of Yogi Berra saying, "It's over when it's over," and it is never over in the United States. They do not have the benefits of a parliamentary system where the case is made in an impartial forum and then the appeal is to the political process rather than the judiciary. Those two aspects create an enormously extended regulatory lead time and push up the costs of US nuclear. It is one of the factors. There are others.

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Mr McGuigan: I guess the future of their nuclear does not look very bright under those circumstances.

Mr Probyn: It is interesting that you should mention that. One of my clients is Bechtel Corp. They are involved in the development of an advanced pressurized water reactor design, as are both General Electric and Westinghouse, who I believe are the two subcontractors to the US Department of Energy. It is a 600-megawatt so-called inherently safe reactor.

They feel, as I do, that nuclear power has enormous environmental advantages if the waste management problem is resolved and if the public can regain confidence in it. Nuclear stations do not emit acid gas; they do not emit NO^x ; they do not emit carbon dioxide. Those are the facts of the matter. It does put a role for nuclear in the future. Today I think we need more independent power and gas cogeneration. There is a balance. That is always my message.

Mr McGuigan: Thanks very much.

Mr Cureatz: I enjoyed the line of questioning by Barbara about the environmental aspects and private companies. I want to follow through just for a moment on your comment on the proposed section 30 in your amendment and its interference with the free trade aspect.

I could get really cute and get your response. My colleague pointed this out to me at the beginning and said, "Look at this. Why don't you get cute?" So I will get cute.

You obviously are familiar with the generation of electricity and, for instance, the Richview switching centre. It seems to me that it does not matter a hill of beans what they put in here in terms of the attempt at restriction of the passage of electricity because we are so interlocked in the grid system. Am I wrong? I do not think I am. The electron that is produced up at Bruce winds up down in Texas, with the switching back and forth. Notwithstanding what they say, I think it is almost technically impossible for them to throw the switch so that the electricity will be stopped at Niagara Falls.

Mr Probyn: I agree. You are not cute, but the bill is, with all due respect.

Mr Sterling: That is the best submission he has made all day.

Mr Probyn: Essentially, one of the great advantages that Ontario has is the integration into the northeast power grid. Quebec is not integrated in that way and so its power is worth less to the US consumer; it is less reliable. We are integrated. Ontario does not have firm power contracts. Presumably a firm power contract with dedicated capacity, say, on this side of the border, would fall under that legislative restriction.

I think you are right. On technical terms, it is highly unlikely—you will have to ask the gentleman from Hydro whether I am exactly correct on this—that this provision of the act would ever be brought into force.

Mr Cureatz: It makes you wonder why they are doing it, does it not?

Mr Probyn: Right. And it makes me wonder why they would want to give Congressman Dingell, who is not exactly one of our friends in Congress, something to wave around and say: "You know that free trade act that was passed? Well, this is what is happening. These provinces are just skating around it."

I suppose a confrontation with the federal government is always a good thing to have. It sort of clears the air and makes you feel good on

Monday. But quite frankly, I do not see that it really provides a practical purpose. It may be subject to some sort of court challenge by some pro-free-trade group or some American group at some future time. It adds to the uncertainty of legislation which, as I have said, I basically support.

My advice to the government, respectfully given, is that they take it out.

Mr Cureatz: Let me have one question. I will ask it anyway. The likelihood of it ever happening, out of one to 10, 10 being that Ontario would instigate the provision of the bill so that no electricity would flow to the United States, I would say is 9.9 that it will not happen.

Mr Probyn: In the current millenium I would agree with you.

Mr Sterling: I was very much interested in my colleague's questioning on the free trade agreement and your comments on it. With regard to some of what I would call the less fortunate provincial jurisdictions in our country, you had made a suggestion in your brief that they are somewhat more reliant on their export of energy than we would be in our economy. Have you heard any concern expressed by those other jurisdictions regarding this bill, or are they just not aware of this bill at the present time?

Mr Probyn: I have not heard any. I suspect they are not really aware of the bill. It seems to me, as you say, that electric power has enormous regional development prospects right across the country.

To give you an example, the Murphy Creek project which we are submitting through BC Hydro Powerex—Powerex is its power export company—would provide about 1,000 jobs in the BC interior, which is a depressed part of the world. Premier Buchanan of Nova Scotia has been promoting a power export program to the United States through a cable that would run from Digby Neck to Boston.

The parts of Canada that have regional disparities often have potential for electric power development. It is not a panacea, but I think it is important.

I happen to live, as many of you do, in the most prosperous city in Canada, if not North America. Ontario has done extremely well, and for us to say, "Sorry, guys, we don't think you should have it," might irk them just a bit. That is one of my points.

Mr Sterling: Quite frankly, I viewed section 30 of this bill as just being silly, and I challenged the Attorney General (Mr Scott) as I did with

regard to other pieces of legislation to take it to the Supreme Court of Canada so it would finally put the whole matter to rest as to who had the power to enter into commercial treaties with foreign countries.

Quite frankly, as a provincial politician, I have been embarrassed by our Premier, in him holding himself out as having the power to block commercial treaties with other countries, because to me it says to other countries, "What kind of country is this when their own federal government can't make a deal that sticks?"

Therefore, I encourage the Attorney General to take these kinds of clauses to the Supreme Court of Canada to get a final ruling, because I know what is going to happen: he will go home with his tail between his legs. Anybody who has listened to the constitutional arguments on this, as I have, will say there is just no question.

By putting these kinds of clauses into legislation, not only do you do what you are talking about in terms of alienating other provinces further from Ontario, which I think is very detrimental to the whole idea of the concept of Canada, but also you take away from the provinces if, in fact, push ever comes to shove and it is decided that our federal government has the sole power to make these kinds of deals without consultation.

We have had a consultative process in the past dealing with free trade and with other things. Some people did not like the results of the consultation, but the fact of the matter is, for the past 50 years of our history we have consulted and had a say. If you lose that consultative mechanism then you get one government at the centre doing it without even having to say, "I'm not going to deal with guys like Peterson because all he is going to do is use it as a political football and will not agree with what the federal Parliament and the majority of the provinces agreed to."

I think it is interesting that you think it is not only silly but it could be very detrimental to us.

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Mr Probyn: I would urge the committee in its report to urge the Attorney General to make a general reference to the Supreme Court if that is indeed the case. If the government of Ontario feels it has the ability to overturn the federal free trade act through its own legislation, then I would urge your reference to the Supreme Court.

As somebody in business and somebody in this sector, I would urge the committee to sort of abstract this debate from what I consider to be

beneficial and positive legislation; it is not needed.

Mr Sterling: Frankly, I would be quite willing to do that and I am sure—

Mr Cureatz: I'll propose an amendment next week.

Mr Sterling: Yes, we will propose it next week. Maybe even the opposition party, the New Democrats, would be willing to support such an amendment, for other reasons.

The Chairman: As we are out of time here as well, we will look forward to that next week then. Mr Probyn, thank you very much for coming in and for making this presentation and for sharing your thoughts with us.

Our next witness is Jocelyn Barber. Perhaps you might introduce yourself formally for Hansard and then I will turn the floor over to you. You have about 45 minutes allotted to you to divide up as you wish, but you might want to leave some time for members to question you.

Mrs Barber: My presentation is quite short.

The Chairman: All right. Introduce yourself and then proceed.

JOCELYN BARBER

Mrs Barber: My name is Jocelyn Barber. I appreciate this opportunity to make some comments on sections of Bill 204, An Act to amend the Power Corporation Act.

The proposed amendments to the Power Corporation Act contained in Bill 204 do address some but not all of the concerns that have been identified in a series of inquiries over the last 15 years into various aspects of Ontario Hydro's activities and operations.

It is encouraging to see an attempt to grapple with the role of the province and the Ministry of Energy in Ontario Hydro affairs. The lack of public input into decision-making on issues that ultimately affect us all, not just the steady supply of electric power, is a measure of concern in this province.

I know other presenters will be discussing the important amendments—parallel generation, the energy efficiency program and the amendments necessitated by the advent of free trade. I would like to comment on amendments to section 42 and section 34.

Section 42 of the current act deals only with the continuance of "any right, interest, way, privilege, permit or easement." The proposed amendment is more complicated. Subsection 1 of the amendment gives a definition to "right." Subsection 2 repeats the wording of the original

section 42 on the continuance of rights. Subsection 3 deals with the transfer of rights from the corporation to municipal corporations and commissions; this is a new subsection. The new subsections 4 to 9 deal with access to information available to individual purchasers re the corporation's rights not registered under the Land Titles Act or the Registry Act. I would like to comment on the assignment of rights.

Subsection 3 states, "Where a right mentioned in subsection (1) has heretofore been or is hereafter assigned by the corporation to a municipal corporation or a commission established or deemed to be established under part III of the Public Utilities Act, unless it is otherwise agreed, the land continues subject to the right for the term of the assignment and the right continues to bind all owners of the land until expiration or release by the municipal corporation or commission.

"Right" is defined in subsection 1 as "any right, interest, way, privilege, permit or easement." It would seem that this provision as it stands could be capable of misuse. Any easement could be handed over to a municipal corporation. That is what this provision says. A major part of Ontario Hydro's easements would be for transmission. Municipal corporations and commissions are concerned with distribution.

I have discussed this provision with a representative of the Ministry of Energy's legal section. I was told that the municipal corporations and commissions hold thousands of unregistered easement documents and that subsection 3 overcomes the expense of registration.

I am not objecting to distribution rights and distribution easements being handed over to the succeeding distributor and supplier of power. I think the phrasing leaves the provision open to misuse.

I would recommend the deletion of "any" in subsection 1—any right, any interest, any way, any privilege, any permit, any easement. Some of these easement documents have confining terms that would be in conflict with "any." I can personally assure you that misuse of easements does occur and when it does there is no avenue of recourse for the damaged party.

Has any attempt been made to discuss this provision with the people and the properties that originally granted these rights, interests, ways, privileges, permits and easements to the corporation? I feel that these parties need representation in issues that affect their interests. Has there been or will there be official notification in the Ontario press? Is none required?

I know the presumption of public interest lies on the side of the corporation and the municipal corporations and commissions. This provision relates to property that is not owned by the corporation. As this type of property right is granted by a legal document that has two signatories, how can the terms now be changed by one of the signatories? Is such unilateral action legal in the real sense of the term? Is there some way this provision can be improved so that it will not be open to abuse?

Bill 204 will also make some changes to the sections dealing with compensation for damage to property. I would like to point out to the committee that the present Power Corporation Act does not provide any mechanism for dealing with damage to property resulting from a violation by Ontario Hydro of the terms of an existing easement; an easement being the right granted by one property owner, while retaining ownership, to another to use a part of his land for a specific purpose. The sections of the current act dealing with compensation for damage to property are sections 33, 34 and 35.

Section 33 applies the Expropriations Act to power exercised under sections 23 and 32, if the exercise of those powers resulted in expropriation or injurious affection. Section 23 deals with the acquisition of properties of all categories, with the authorization of the Lieutenant Governor in Council, for the works of the corporation. It authorizes initial purchase, expropriation, lease, use or otherwise. Section 33 deals with the damage consequent to that initial action. Section 23 does not deal with actions taken after initial purchase, expropriation, lease, use or otherwise, and quite properly such occasion would not arise after initial acquisition or expropriation, but could in the case of lease, use or otherwise.

Section 23 does not differentiate between the absolute authority over sections of property acquired by the processes of purchase and expropriation and the conditional authority implied by specific terms of leases and easements. Section 33 therefore only applies to damages occasioned by the initial action and not damages consequent upon subsequent actions.

Subsection 32(1) translates the enabling powers of section 23 into effect. Subsection 32(2) extends the corporation's authority to property adjacent to the corporation's rights of way.

Section 33 applies the compensation mechanisms of the Expropriations Act to powers exercised under section 23, which we have seen only deal with initial purchase, expropriation, lease, use, etc., and to powers exercised under

section 32, which translates those powers into action and extends the corporation's authority to property adjacent to the corporation's property, but only when the exercise of that power constitutes an expropriation or injurious affection.

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In other cases, when the power exercised does not constitute an expropriation or an injurious affection, section 34 sets up a compensation mechanism with three possible levels of adjudication: the board of valuation, the Ontario Municipal Board and the Divisional Court. However, that mechanism is only for damage resultant upon the exercise of powers granted by section 23 or by section 32. It does not apply to damage resulting from actions taken subsequent to the initial exercise of those powers.

The new section 34 simplifies the compensation procedure but inherits some of the wording of the current act and only applies to powers exercised under section 23, initial acquisition, etc., or section 32, initial action and extension to adjacent properties.

Section 35 deals with crop damage where compensation is determined by a board of valuation. This is not changed.

There is nothing in the current act or in the amendments to this section of the act that deals with Ontario Hydro's violation of the terms of the easements it holds over other people's property. Those specific terms were the terms chosen by the corporation itself at the time it acquired the easement.

There are hundreds of easement holders in Ontario. Energy advocacy groups say they receive many phone calls from easement holders on this particular issue, the violation of terms of the easement and consequent damage to the property. It happens. I can personally assure you that it happens. Why are easement holders left unprotected by the Power Corporation Act? Why is this situation perpetuated in the new amendments to the act?

We have to remember that the generation and transmission systems are growing and changing constantly, and consequently opportunity arises for errors to be made. It is possible that there could be problems for the ordinary citizen of Ontario in dealing with this particular crown corporation on a legal matter. I am stating with extreme diffidence but with personal experience that it becomes impossible to reach a satisfactory conclusion to a complaint made by an easement holder. Why is this so? This subject is difficult to talk about. It involves ethics; it involves percep-

tions; it involves mental attitudes, and it involves corporate atmosphere.

The Cresap overview study, in examining the levels of administrative and managerial staffing within Ontario Hydro, analysed Hydro's corporate culture as, "Be careful, no mistakes, hang together." This particular corporate culture is a deterrent to the satisfactory resolution of differences between the corporation and its easement holders. Easement holders are only going to make complaints when some action of the corporation's employees results in damage to their property. This, of course, can only occur when an error is made by the employees. But they are working for a company that says, "No mistakes." In a company where no mistakes are allowed, there is active encouragement to employees to be untruthful. Once an initial untruthful stance has been taken by a couple of employees, it is the collegial duty of the other employees to support this stance, to hang together.

Yes, Ontario Hydro easement holders need protection in their dealings with this corporation. This protection should be in place in the original Power Corporation Act. It is not. What can we do to remedy the situation and what can you offer?

Mr Cureatz: I am trying to get a handle in terms of your specific concern. Have you encountered something personally in regard to the area of the topic?

Mrs Barber: Yes, I have.

Mr Cureatz: I would like some information on it so I can relate it to the general overall picture you have presented to us.

Mrs Barber: I am in litigation with Ontario Hydro and it does not really seem to like people to talk in very particular terms.

Mr Cureatz: I see. That is fine. We encountered that yesterday.

Mrs Barber: Yes, there is a slight atmosphere of hysteria, I think. For example, I notice in the new subsections 42(4) to 42(9), you are ensuring compensation for people who have not even purchased property. That is what one of the subsections says. As I say, there are thousands of easement holders in Ontario and simply because of the way those particular sections are written, there is no kind of procedure for them to recover damages from Ontario Hydro.

Mr Cureatz: When you say easement holders, are you saying Ontario Hydro has easements over people's property?

Mrs Barber: Oh, yes.

Mr Cureatz: That is what you term an easement holder.

Mrs Barber: Initially, for example when they put in the ??Gatineau line, I would suspect that 70 per cent of the line went over easements, not over Ontario Hydro's property.

Mr Cureatz: Oh, I see, an easement over an easement. Ontario Hydro would probably have to get the transmission rights to go over a stretch of area, and to go over that stretch of area it would encounter people who also have easements.

Mrs Barber: No, I am referring particularly to easements granted to Ontario Hydro over property.

Mr Cureatz: That then is your term easement holder. Ontario Hydro is the easement holder.

Mrs Barber: No, I am sorry. I regard the property owner as the easement holder.

Mr Cureatz: Okay. That was well put. I have to say that on a constituency level, I have not encountered difficulties with people and easements to Ontario Hydro, or for that matter, I am trying to think of any other major corporation, be it a municipality and the like.

Mrs Barber: Do you have transmission corridors in your constituency?

Mr Cureatz: Yes, I do. There are many. Now, I am thinking in terms of new transmission corridors where Hydro has bought out the corridor, so I suppose those people who had the property are stopped because they have negotiated whatever the terms are in terms of giving up the easement right. Generally speaking, when people have come back to me after a length of time and have said Ontario Hydro has not lived up to its agreement on maintaining the easement, or the way it has maintained the easements has affected people whose property adjoins the easements—no, I have not encountered that.

This does not mean it does not happen and obviously you have encountered it. I do not know; it almost seems like a technical point, I say to our parliamentary assistant. It would be interesting if our staff might follow that up. I would like to have a bit more information on it if it is possible.

Mrs Barber: The legal crux of it really is section 23. All the enabling clauses of the Power Corporation Act are contained in section 23, and they are all subsidiary to a paragraph that says the corporation's power comes via the authorization of the Lieutenant Governor in Council. This, of course, is just for the initial acquisition of property. It does not really deal with what

happens after the property is either acquired or leased.

Mr Cureatz: After it has been acquired or leased.

Mrs Barber: No damage could arise if it is Ontario Hydro's own property, if it has expropriated or purchased it, but it can arise if the property is only leased or used by the terms of an easement. I think that is what I am trying to point out. We should have something, some change in the words.

Mr Cureatz: Some guidelines in terms of the usage of it, the manner in which it should be used.

Mrs Barber: Yes.

Mr Cureatz: Am I getting there? Okay. That is a nice safe area, I say to the parliamentary assistant. I mean, we are not being too controversial and actually it seems to look logical.

Mrs Barber: I cannot believe this has never been pointed out before.

Mr Cureatz: I cannot believe the Liberals are running the province of Ontario, but they are. Anything is possible.

The Chairman: Is the researcher clear enough on what Mr Cureatz is looking for? If not, perhaps you can work that out.

Mr McGuigan: My question may be a little late now. I am just wondering, Mrs Barber, without touching on your own case, do you know any example of any other case you could present to us in simple terms so that those of us who are not lawyers like Mr Cureatz might relate to what you are talking about?

Mrs Barber: I am disappointed that it was not that obvious, so I must not have stated it very well.

Mr McGuigan: I think you stated it exceedingly well. It is just that we have not had the experience you have had and a practical example would be helpful. I know you are constrained by your own case. I was just thinking you might have run across some other case you could use as an example. Think about it, because I do not want to endanger your own.

Mrs Barber: I do not think Ontario Hydro likes you to talk about particulars. What I am saying is that my case with Ontario Hydro really does not have anything to do with this issue, but if it had been legislated in the act that it is liable for damages it does during the term of easement, I think that is really what I am asking for. It is not actually put there. They know it is not there.

Mr McGuigan: I think we can get some clarification from the parliamentary assistant to look into this.

The Chairman: Mr Charlton, do you have any questions?

Mr Charlton: I was just going to say that her concerns were somewhat clearer to me because I am aware of her case. Perhaps just for the information of the committee, we could privately discuss at some point some examples of those that are reflected by her concerns.

The Chairman: If I understand the point here, it is a question of Hydro easements. I am sure your rights are there in common law somewhere, but it is a question of enforcement and you are looking for the possibility of an easier administrative way or some kind of summary way of enforcing those, or getting damages out of Hydro.

Mrs Barber: Yes. I feel the right to compensation damage after the easement has been

signed, because it does occur, should be there in the Power Corporation Act. Of course we have litigation, but you may not have noticed that Ontario Hydro seems to be a very difficult corporation to litigate with.

The Chairman: I have noticed.

Mrs Barber: I feel it would be better if perhaps some changes were made to section 23, or perhaps to section 32.

The Chairman: Are there any further questions from the committee? On behalf of the committee, I would like to thank you very much for coming in and bringing up this subject. It appears to have struck some interest with the committee, so we will see what comes of it.

The Chairman: That is our last witness for the morning committee so I will adjourn now until two o'clock this afternoon.

The committee recessed at 1122.

AFTERNOON SITTING

The committee resumed at 1410 in room 228.

The Chairman: I call the afternoon session of our meeting to order. Just before we start, I should note that members have been handed a photocopy of an article on our committee deliberations. I really did not want to take note of that. I wanted to take note of the paper. This paper was not burned in the photocopier; it is recycled paper. I understand legislative research is now intending to use this.

Clerk of the Committee: Committees branch, clerks' office.

The Chairman: Pardon me, committees branch is using this on an experimental basis. I hope you will all indicate to them how happy you are despite the fact that it may not be pristine white.

Our first witness this afternoon is the Canadian Institute for Environmental Law and Policy. Please introduce yourself for the benefit of Hansard, and I will turn the floor over to you. We have about an hour allocated to you. It would be helpful if you could leave some of that time for questions from the committee.

CANADIAN INSTITUTE FOR ENVIRONMENTAL LAW AND POLICY

Mr Gibbons: My name is Jack Gibbons and I am with the Canadian Institute for Environmental Law and Policy. Our organization was founded in 1970. Its original name was the Canadian Environmental Law Research Foundation. It is an independent, nonprofit research institute.

In 1989, earlier this year, the Ontario Legislature passed a motion requiring the government of Ontario to apply the principles of sustainable development to all areas of government decision-making.

Therefore, it is our opinion that Bill 204 and the proposed memorandum of understanding between Ontario Hydro and the Minister of Energy should be evaluated in terms of their compatibility with the principles of sustainable development.

This afternoon, I am going to attempt to do two things: (1) briefly outline the concept of sustainable development; and (2) suggest how Bill 204 and the memorandum of understanding can be amended to be more compatible with the principles of sustainable development.

The United Nations' World Commission on Environment and Development in its report, *Our Common Future*, defines sustainable development as follows: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

The common name for this report is the Brundtland report. The report concluded that our present level of energy consumption is simply unsustainable. It is unsustainable because instead of living off just the income or the interest of our environmental capital, we are consuming the capital itself. The result will be acid rain, ozone depletion, global warming and species loss.

The Brundtland report had two important conclusions with respect to the energy sector. First, it said the generation of nuclear power is only justifiable "if there are solid solutions to the unsolved problems to which it gives rise." Second, it concluded with respect to fossil energy that the industrialized nations of the world must substantially reduce their consumption of fossil fuels because of the greenhouse effect.

The report made many recommendations about how sustainable development could be achieved but the recommendation that is most relevant to this committee at this time is its recommendation with respect to institutional and legal change. They recommended that the principles of sustainable development should be incorporated into the legislative mandate of important corporations like Ontario Hydro. In other words, the principles of sustainable development should be incorporated into the Power Corporation Act.

I quote from the report: "The major central economic and sectoral agencies of governments should now be made directly responsible and fully accountable for ensuring that their policies, programs and budgets support development that is ecologically as well as economically sustainable."

Unfortunately, the Power Corporation Act, Bill 204, and the proposed memorandum of understanding promote a level of electricity consumption that is unsustainable and excessive. Our level of electricity consumption is economically excessive because it is sold at less than its cost. As the federal government's Energy Options Advisory Committee report said—that is the Kierans report after its chairman Tom Kierans, "To the extent that regulated prices understate the

real market costs of energy, they encourage excessive energy use."

It is ironic that Ontario Hydro sells power at less than its cost since sections 56 and 75 of the Power Corporation Act specifically instruct it to sell power at cost but, as a result of a number of government subsidies and policies and Ontario Hydro's interpretation of the meaning of "power at cost," electricity is sold at less than cost.

I would like to list the principal subsidies that Ontario Hydro receives:

1. It is not required to pay dividends to its owner, the government of Ontario.
2. It is not required to pay federal and provincial corporate income tax.
3. Its debt is guaranteed by the province of Ontario.
4. The hydro rental rate, that is, the rate Hydro is charged for the use of the province's water resources to generate power, is set substantially below its market value.
5. The Nuclear Liability Act limits Hydro's liability in the case of a nuclear accident to only \$75 million.

If these subsidies were removed and Ontario Hydro was required to earn a rate of return equivalent to that of a private sector utility, like Consumers' Gas, then its rates would rise by \$3 billion or 50 per cent. In other words, they receive a subsidy of at least \$3 billion from the government of Ontario. To put \$3 billion in context, that is equivalent to about seven per cent of the provincial budget. In per capita terms, it means that each resident of Ontario gives Ontario Hydro a subsidy of \$300 per year.

The Canadian Institute for Environmental Law and Policy recommends that this subsidy should be eliminated and that electricity rates should be raised by 50 per cent. Higher electricity rates will raise our living standards and the reason why they would do this is that they will ensure that we meet our energy needs at a lower cost. Every major energy study has shown that energy conservation can meet our energy needs at a lower cost than a new coal or nuclear generating station.

If rates are raised by 50 per cent, people will start investing in energy conservation in a serious way and we will not need a new nuclear or coal generating station. Higher rates will also be good for the environment because they will reduce the demand for electricity. This will mean less acid rain. It will mean that our contribution to global warming or the greenhouse effect is reduced and it will mean less nuclear waste.

It is our recommendation that Ontario Hydro's increased profits be used to finance a dividend to the government of Ontario. It is worth noting that the Ontario Energy Board has also called for Hydro to pay a dividend to the government of Ontario.

Removing the subsidies to Ontario Hydro is one step in the direction of sustainable development but it is not everything. Economic rationality is only one component of sustainable development. There is much more to it than that. Sustainable development implies that environmental priorities should be given equal weight with economic priorities. Unfortunately, the Power Corporation Act does not establish such a parity. Rather, sections 56 and 75, which oblige Hydro to produce power at cost, where cost is defined as Hydro's financial cost, force Hydro to produce power in the method that will minimize its financial costs, not the total cost to the public and to the environment.

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In order to remove this bias in favour of minimizing financial costs, not total cost, and to make the Power Corporation Act compatible with the principles of sustainable development, we recommend that section 56 be amended as follows:

"The purposes and business of the corporation include the generation, transmission, distribution, supply, sale, purchase and use of power in a manner compatible with sustainable development."

In addition, subsection 56a(1) should be amended to read:

"The purposes and business of the corporation include the provision of energy conservation programs in a manner compatible with sustainable development."

Unfortunately, the Power Corporation Act's bias in favour of minimizing financials cost as opposed to total cost is reinforced by the proposed memorandum of understanding. For example, on page 3, section 4 of the memorandum states:

"The minister and the Hydro board agree that the business and affairs of Ontario Hydro will be conducted on the principles of commercially sound business practices and power at cost."

It is our recommendation that this section be amended as follows:

"The minister and the Hydro board agree that the business and affairs of Ontario Hydro will be conducted on the principles of commercially and environmentally sound business practices and

power at the lowest economic and environmental cost."

I would also like to bring your attention to another section of the proposed memorandum, and that is section 8 on page 3. That section says:

"The government and the Hydro board agree that the primary objective for the supply, distribution and use of electricity in Ontario is to ensure that Ontario's electricity consumers are provided with a secure and reliable supply of electricity at the lowest feasible cost over the long term."

We would like to propose that this section be amended to read that the primary objective of Ontario Hydro is "to ensure that Ontario's electricity consumers are provided with a secure and reliable supply of energy services"—not electricity—"at the lowest feasible economic and environmental cost over the long term."

There is a very subtle and important distinction here between energy services and electricity. The way it is written now, with its focus on providing electricity at the lowest cost, means the prime emphasis is once again on producing electricity at the lowest financial cost. If you do that, what you are going to do by having a low price for electricity is you are going to promote electricity consumption and just a continuation of what we are doing now.

If you take out the word "electricity" and put in the words "energy services" instead, the whole focus changes. Now we are looking at energy services, not just electricity, and we can now achieve sustainable development, because we can focus in on energy conservation. If Hydro has an obligation to provide energy services, then it must not just provide electricity but also finance energy conservation investments.

Energy conservation investment may, from time to time, raise electricity rates, but that will not raise the total bill because the fall in energy consumption, in electricity consumption, will be greater than the rise in electricity rates, so the total bill will fall and the customer's total energy costs will fall and therefore he will be better off and the economy will be better off and the environment will be better off.

There are a number of other sections in the memorandum of understanding which we think should be amended along the same lines. They are attached in appendix A.

I would now like to turn to the topic of parallel generation or independent generation. Bill 204 is proposing an amendment that would require Ontario Hydro to encourage parallel generation. That is clearly a step in the right direction,

because municipal utilities and private corporations can often provide electricity at a lower economic and environmental cost than Hydro.

But there is a widespread belief that Ontario Hydro's buyback rates, the rates it pays for parallel generation, do not reflect Ontario Hydro's full avoided economic costs and environmental costs. For example, the Ontario Energy Board has stated that if Ontario Hydro were to set buyback rates reflecting their avoided economic costs, then the supply of parallel generation would increase substantially and this would benefit everyone.

Therefore, we recommend that the Power Corporation Act be amended to include the following provision: "The buyback rate for parallel generation shall equal the corporation's avoided economic and environmental cost." We feel that is just good common sense.

I would now like to turn to energy conservation. As you know, one of the purposes of Ontario Hydro is to provide energy conservation. Unfortunately, according to subsection 56b(3), they are not allowed to finance the conversion of an electrically heated home to natural gas. This, in our opinion, is economically and environmentally irrational because natural gas can heat a typical home at a lower cost in terms of dollars and carbon dioxide emissions than electricity. It is our recommendation that subsection 56b(3) should be repealed.

There is another idiosyncrasy of the Power Corporation Act when it comes to conservation, and that is section 95a. That says any expenditure by a municipal electric utility to finance conservation must be expensed in the year the investment is made. In other words, conservation investments cannot be capitalized by municipal utilities. That just flies in the face of a basic principle of accounting, that if you make a capital expenditure which will have a useful life over many years, you should be allowed to recover that cost over many years. But for some reason, the municipal utilities are forbidden to do that. It is our recommendation that section 95a should also be repealed.

Turning to the question of accountability, if our proposed amendments to the Power Corporation Act to make it compatible with sustainable development are accepted, they will not be fully effective unless there is a mechanism to make Ontario Hydro accountable to the Ontario Legislature and the people of Ontario.

Despite the fact that Ontario Hydro is a monopoly and the largest corporation in Canada, it is virtually unregulated. Every time it wants to

raise its rates, it has to go before the Ontario Energy Board and the OEB reviews its rate proposal and makes a recommendation to the Minister of Energy. But after the OEB has made its recommendation, Hydro can do whatever it likes. It can ignore every single one of the board's recommendations.

This state of affairs has led the Ontario Energy Board to question the whole value of the review process. The lack of a regulator with teeth will be a barrier to sustainable development if Ontario Hydro is biased against those options which are most compatible with sustainable development. Unfortunately, that appears to be the case. It seems to be biased against conservation and parallel generation.

For example, with respect to energy conservation, the Ontario Energy Board has stated, "The external evidence is not consistent with Hydro's claim to a commitment to conservation." Hydro's limited commitment to energy conservation is demonstrated by its capital budget for 1990. In 1990 it is planning to spend 130 times more money on electricity supply investments than energy conservation; that is, it is planning to spend \$2.9 billion on electricity supply and only \$22 million on energy conservation.

The OEB has also noted that Hydro appears to be biased against parallel generation. When Mr Wong, the former Minister of Energy, introduced Bill 204 to this committee, he said that one of his next priorities would be to amend the Ontario Energy Board Act. It is our submission that to make Ontario Hydro accountable to the people of Ontario and to the Legislature, the Ontario Energy Board must be given binding regulatory authority over Ontario Hydro.

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In short, it should have the same powers with respect to Ontario Hydro that it has with respect to our gas utilities like Consumers Gas, Union Gas and ICG Utilities. Furthermore, it is our recommendation that appointments to the boards of the Ontario Energy Board and Ontario Hydro should be ratified by this committee.

I would now like to turn to the issue of municipal electric utilities. There are more than 300 municipal electric utilities in Ontario and they are the people who retail Ontario Hydro's power. I think it is very ironic that despite the fact that Ontario Hydro is virtually unregulated, the municipal utilities are regulated by Ontario Hydro. We believe that in order to promote sustainable development and to give the municipal councils greater control over the utilities they

own, the following amendments should be made to the Power Corporation Act.

1. The municipal electric utilities should be required to operate in accordance with the principles of sustainable development.

2. Their rate of return should be equivalent to that of a comparable private sector corporation.

3. Ontario Hydro's regulatory control over the municipal utilities should be abolished.

4. The Ontario Energy Board should be permitted to review the rates and budgets of the municipal utilities.

The final topic I would like to address is electricity exports. According to section 30 of Bill 204, the price of electricity exports must "recover the appropriate shares of the costs incurred in Ontario." In our opinion, this section is symbolic of the fundamental flaw of the Power Corporation Act, Bill 204 and the memorandum of understanding. Why does it not say "economic and environmental costs"? Why does it limit itself to costs incurred in Ontario? Ontario Hydro's sulphur dioxide and carbon dioxide emissions do not stop at the Ontario border.

We believe this section should be amended to state that the price of electricity exports should recover the economic and environmental costs incurred, period, with no limitation to where they are incurred.

In conclusion, I would like to say this: In 1906, Ontario Hydro was created to foster economic growth in Ontario by developing our abundant hydraulic resources, such as Niagara Falls. It has succeeded in its original mission, but it is now 1989 and times have changed. It is our belief that the primary economic policy objective for Ontario for the 1990s and beyond should be the attainment of sustainable development. As a consequence, we believe the Power Corporation Act should be amended to incorporate the principles of sustainable development so that Ontario Hydro can once again make a major contribution to meeting human needs.

Mr Callahan: It is an interesting brief and it raises a lot of significant points. Were there any figures produced by your body as to what the increase in monetary return would be to Hydro if it were to export electricity on the basis you have suggested, ie, a 50 per cent increase?

The reason I say that is that although you present a persuasive argument about our protecting our environment and also increasing costs to do that, with the federal goods and services tax looming on the horizon and the rapidly increasing cost of housing, we would find it very difficult to saddle it on the backs of those people

who right now are struggling to find reasonable accommodation, an additional—according to this news report; maybe it is in your brief—almost \$225 a year.

What I would like to know is, have you any facts on what the province would reap if it were to add the environmental cost in the cost of electricity that is being exported from this country or from this province?

Mr Gibbons: No, we have not analysed that question. This is a principle that we think is the right principle to follow. We are covering our price, at least our total costs, economic and environmental. In our opinion, the export would not make any sense because the benefits would not exceed the cost and there is no gain to us. Just what the price would be would depend on each export. If it was an interruptible export where you did not have to build a new plant to supply it, the costs would be lower than if it was a dedicated firm export where you have to build a new plant. It would be different depending whether it was hydro power, coal power or nuclear power.

There is not one answer. It would depend on all kinds of different circumstances. What we are trying to do here is just set out the broad policy framework and we are just saying, make sure what you recover is better than or equal to the cost.

Mr Callahan: I appreciate that, but I wonder if your group could readily give us some sort of ballpark figure as to what that additional revenue might be for exporting not just from Canada to the United States or any other place, but to other provinces.

Mr Gibbons: My initial inclination is to think that it would not lead to additional revenues. When Ontario Hydro makes exports it tries to get the highest price it possibly can because it wants to make as high a profit as it can. If this does anything, it will force them to charge an even higher price and that, if anything, will reduce their total exports and probably reduce their total revenues. I would not see this as a get-rich scheme.

Mr Callahan: I am not suggesting it is a get-rich scheme, but you did suggest that at the present time the export of energy does not include that environmental component. The second thing is that with the free trade agreement, even though we have a clause in here, I happen to think it is within our jurisdiction. If it were ever to be challenged, we would have the option of doing that, I think, quite legitimately, that we were recovering our environmental cost. I have some difficulty, though, with the impact

of the 50 per cent increase immediately on the citizens of this province.

Mr Gibbons: Can I respond to that? First of all, you said that we are going to have a goods and services tax increase and all kinds of other tax increases. The cost of living is rising. Housing costs are very high in Toronto. That is true, but the point we are trying to make is that a 50 per cent tax increase on hydro does not have to increase our standard of living, because if Mr Nixon gets \$3 billion more from Ontario Hydro he can reduce other taxes by \$3 billion. There is no need for a net increase in taxes. We are saying: Create a level playing field. Tax Hydro fairly. Make it pay its fair share. That means it will pay a larger contribution and other people's taxes can be reduced. That is the first response to it.

The second response to it is that energy conservation can meet our energy needs at a much lower cost than a new nuclear plant or a new coal plant. If we collectively, as a province, invest in energy conservation instead of a new nuclear plant, our total energy costs will be lower, our economy will be more competitive and our living standards will be higher. The way to make sure we do this is that we have to raise the price of electricity so that people will invest in energy conservation, the cheap alternative.

Mr Callahan: You have indicated, or it is reported in the news report, that Inco, Falconbridge and I guess companies like that would be the largest contributors to that additional cost. That raises some interesting points because Falconbridge, as I understand it, has just been sold to US control—

Interjection.

Mr Callahan: No? Do you want to take that? It is in your area. What impact might that have on the question of employment, too?

Mr Gibbons: To address that question, electricity rates are subsidized and therefore the people who get the biggest subsidy are the large industrial consumers. Our point is that if you think there are going to be negative employment implications from a 50 per cent rate increase, or if you think it is too sudden and should be phased in—what we are saying you should do is raise Ontario Hydro's rates by 50 per cent but if you think it is going to have a negative impact on the workers at Falconbridge or the workers at Inco, there are a number of things you can do.

The Ontario government could give a direct subsidy to Falconbridge or Inco. The subsidy could be to subsidize energy conservation investments. The subsidy could be to create

employment, if that is what you want to do. If you want to create employment, the best way is to give a subsidy that is tied to the number of jobs you create, not the amount of electricity you consume. That, in our opinion, is just economically and environmentally perverse.

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Alternatively, the government, the Treasurer (Mr R. F. Nixon), could give half that \$3-billion rate increase back to Ontario Hydro and it could spread it over all its customers or whatever you like. The advantage of this would be that there would then be a taxpayer-financed subsidy that would be very clear on Mr Nixon's books. The public would know who was being subsidized by whom. Therefore, the people who were getting the subsidy would have to justify it. Now, it is hidden. The vast majority of people in Ontario do not realize it is going on and that is why it is allowed to last.

The Chairman: Mr Brown, did you have a supplementary on that point?

Mr Brown: Yes, I did.

Mr Callahan: He is going to tell me who owns Falconbridge.

Mr Brown: Noranda.

On this subject of export and import, it seems to me one of the things you are saying here is that we should not import electricity at less than the full environmental cost—

Mr Gibbons: Right.

Mr Brown: —because we still get the acid rain, regardless. What is your view, then, if Ontario chooses to export electricity, with the full environmental costs built in, in order that we do not get the acid rain from New York state? That is the corollary, the reverse of what you are saying.

Mr Gibbons: I just do not think that is an option that is available to us in the next 10 years or so, because Ontario Hydro's incremental source of electricity now and for the next 10 years will be coal. If they are going to make any electricity exports, they are going to be from a coal station, not from a nuclear or hydraulic station, because they are basically running full out all the time. If we are going to be making electricity exports, they are probably going to be coal-fired electricity exports and they are going to increase the acid rain right here in Ontario.

Mr Brown: I guess what I am saying is, living in a kind of philosophical state here for a moment, what if we had the technology—perhaps we do in the nuclear stations—to do these things

without impacting on air quality or water quality or whatever? Would you see that as a viable way of taking American coal-burning plants out of production? I am talking all costs in, including the environment.

Mr Gibbons: I think what you are saying is, should we build nuclear power plants to export power to the United States to displace its coal-fired electricity?

Mr Brown: Yes.

Mr Gibbons: I just do not think that would work, because if you had to recover the full cost of a nuclear power plant, I do not think the Americans would buy it.

Mr Brown: I am saying, if it did, if the numbers crunched.

Mr Gibbons: Then I would go back to the fundamental principle of Brundtland. They said you should not expand nuclear power unless all the unsolved problems to which it gives rise have been solved. Since they have not been solved, I would say no.

Mr Matrundola: Listening to your comments and having read this article here, "Hike Prices by 50 Per Cent Hydro Told," I would like to say that while it is very important for a clean environment to stop acid rain and slow the warming of the atmosphere, it is equally, if not more important to achieve this goal by not increasing the cost of energy. I can tell you that while I am here, either on this committee or at Queen's Park, I will do whatever I can to make sure that the cost of energy, the cost of electricity is not hiked.

I believe we must find a happy medium, some way to balance, to achieve the goal, but not by increasing the cost. The public is already paying too much for the cost of energy. There are possibly other ways of doing it, and natural gas might be one way, but there are also other ways. However, for whatever you achieve on the one hand, you might have a check and balance on the other, because with more natural gas we may be more susceptible to accidents like the one yesterday on the Danforth. You never know.

I believe that sometimes we have to strike a balance and make a choice, to get a little of this and a little bit of that without getting hurt too much. Somebody says, "I want to be poor all my life and I want to be very healthy." It might be worth while to be not so healthy but not so poor all your life.

What I am trying to say is that we have to find other ways—I believe this should be the mandate of this government and of Hydro—to achieve the goal without increasing the cost of electricity,

and if anything, to reduce it. We should definitely advocate conserving electricity, to use less electricity. I made these comments before here because I believe that we waste it, but definitely I am dead against increasing electricity costs 50 per cent.

Mr McGuigan: Mr Gibbons, you made a statement here; from the other answers, I am sure you probably are correct but I did question it. You said that you can heat with natural gas at lower CO₂ than with electricity. I have not got any figures, just the fact that our electricity is roughly one-third water power, one-third coal and one-third nuclear, and then the coal is peaking power. It would seem to me that especially when you take into consideration that most people heating by electricity also have very high standards of insulation, R-2000 or something near that—I wonder if you really have an analysis to back that up.

Mr Gibbons: Yes, I do, sir. It is in footnote 19. The thing is that it is true, as you say, that Ontario Hydro only gets about, say, 20 per cent of its total electricity from coal. But coal, as you also said, is their peaking fuel and virtually all the homes that are heated by electricity happen to be heated by coal-fired generating stations. If Ontario Hydro lost its space-heating load, it would shut its coal stations because those are the ones that always shut down first.

When we are talking about electric heating, we are talking primarily about coal-fired electric heating and the CO₂ emissions from coal are substantially higher than those of natural gas. That effect is magnified by the fact that coal stations have a combustion efficiency of only about 35 per cent. That means for every three units of coal energy you only get one unit of electricity energy, whereas with a high-efficiency natural gas furnace you can get a combustion efficiency of 95 per cent.

Mr McGuigan: I follow your line of thinking, but if you take, say, an R-2000 home—

Mr Gibbons: I am talking about homes that have a comparable level of insulation. That is what I am assuming. I would advocate that all homes should be well insulated. Yes, that is certainly true. If you are going to compare a big huge castle—Casa Loma—heated by natural gas with no insulation versus a small, very energy-efficient electric home, that small, energy-efficient electric home will produce less CO₂.

Mr McGuigan: With any home that is heated with electricity, it is not heated with electricity

just at peak times; it is heated with electricity the full 24 hours.

Mr Charlton: If you eliminated all the electric heating, you would not need the coal-fired plants running in the winter.

Mr Gibbons: That is my point, yes.

Mr McGuigan: I am not unsympathetic at all to your brief. I have used these same words myself, looking at what happened with liquid fuels in the Arab-Israeli war in the early 1970s when basic oil went from about \$2.65 a barrel to as high as \$40 a barrel, and it has now settled back to about \$20. We got all that tremendous development in more efficient automobiles. But one of the lessons we sort of forget in that is the magnitude of the jump. It was not a 50 per cent jump from \$2.65 up to \$4; it went as high as \$40.

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We do have that propensity in our society that when we encounter a little extra cost in some area, then we try to recover that in the cost of the products we sell or the costs of our labour or services. We add it to inflation rather than making the saving. I guess none of us can prove our point, but I just want to make the point that in the saving of oil, it was a magnitude of eight times or so before we really got these energy savings. As a matter of fact, it was a magnitude of about 15 times before we got them.

Mr Gibbons: I certainly agree with you: The higher the price, the bigger the reduction in consumption you get. If you called Ontario Hydro's chief load forecaster before this committee and asked him what would happen after a 50 per cent rate increase, I think he would testify that there would be quite a substantial reduction. That would be all to the good, I think.

We are advocating more than this. We are talking about sustainable development. We are talking about Ontario Hydro becoming an energy conservation utility and financing even further energy efficiency investments. I take your point. If we raise electricity rates by 50 per cent, that is not going to solve all our problems for all time; we are still going to have to do other things eventually.

Mr McGuigan: I think of a colleague's comment that if we eliminated electric heating in homes, then we could eliminate all the coal-fired plants. Are you not going to require peaking power in any circumstances?

Mr Gibbons: You mean now the natural gas utilities will have to meet peaking power?

Mr McGuigan: No. His comment was that if we eliminated all electric home heating, we

would not have to burn coal, because theoretically the amount of coal that is burnt is equal to the heat load of electrically heated homes. Under any condition of electric use, we are still going to need peaking power.

Mr Gibbons: That is very true, but certain hydro stations can also provide peaking power. So if we substantially reduce our load and displace coal, presumably we can meet more of our peaking load by hydro power. I am not saying we will be able to phase out all coal, or maybe we will find that it is appropriate to have parallel generation from natural gas cogeneration to provide peaking power or some other form like that. It is quite true: We still may need some fossil-fuel plants of one type or another for peaking power. They do not necessarily have to be coal, and if they are natural gas, that is much cleaner.

Mr Charlton: It was a good presentation. I think we largely agree on the problems that are caused by the subsidies. I am not sure we totally agree on how we resolve those problems. Traditionally, I have always taken the opposite view: The subsidies are in fact subsidies that are created by the people of Ontario, not by anybody else, and they have a right to take advantage of their own subsidies, but the subsidy should in effect be available to all the alternatives as a way of levelling the playing field and sending the right signals in another way.

For example, one of the things that concerns me about just outright raising the price to send out the right signal in terms of conservation is that it sooner or later becomes the norm. In other words, it becomes part of inflation and it becomes part of wage demands and then it becomes—

Mr Gibbons: That is why I—

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Mr Charlton: Let me finish my scenario. We have always taken the opposite view, that, yes, the subsidies cause a problem in terms of people's approach to conservation, energy efficiency and a number of other things in society, but if we were to approach the question of the subsidies and make them available, for example, to efficiency technologies, if we were to treat efficiency technologies in the same way as we treat capital investments in generating facilities, we could maximize the amount of efficiency we can bring into the system at any given time over the long run at the same time as retaining the economic and social advantages of the low hydro rates in Ontario.

You hit part of the nail right on the head, from my perspective, when you suggested that in our present system, the subsidies for the most part are getting handed left, right and centre to the large industrial sector in Ontario. I would find it particularly objectionable to impose a 50 per cent rate increase on a rate structure that is already admitted by most to be totally inappropriate in social, economic and signal terms in terms of questions like conservation and energy efficiency. How do you deal with all those problems in terms of the rate structure, which you seem not to have dealt with at all in here?

Mr Gibbons: You raised many questions and points and I will try to respond to them as best I can. I guess part of the problem is that you and I may fundamentally disagree or maybe we just have different ways of achieving the same end. I think I disagree with some of your premises.

You say that our proposal for a 50 per cent rate increase will lead to inflation and raise the cost of living, etc. I just do not accept that. I disagree with you fundamentally because this \$3-billion tax increase can be used by Mr Nixon to reduce other taxes by \$3 billion. In the last budget, he increased some taxes, but he eliminated the OHIP premiums. We are talking about doing exactly the same thing here. There is no net increase in inflation because of taxes going up.

Mr Charlton: You suggested, for example, that maybe we could subsidize Inco and Falconbridge, which are paying the lowest rates, on that 50 per cent rate increase.

Mr Gibbons: If you want to. Somebody said he was concerned about employment. I am saying that if you are concerned about employment in the Inco mine, maybe you should give Inco a subsidy in relation to how many people it employs, if that is what your concern is.

Mr Charlton: My point and my comment is that in that kind of grab system, it will be those who are best able to present their case who will get the \$3 billion and it will not be those who are working at the minimum wage and paying the highest rate for their electricity to get those dollars.

Mr Gibbons: Let me outline a scenario that I think will be more in line with what you want to do. I suggest that you have a \$3-billion rate increase, Mr Nixon reduces the taxes to the people you think are most deserving or gives a tax credit—

Mr Charlton: How do I get him to do that? I have not figured that one out yet.

Mr Gibbons: —give a tax credit to low-income people. Second, over and above the tax issue, it will not be inflationary, because it will encourage investments in energy conservation which can meet our energy needs at a lower cost than a new nuclear or coal station. It will make our whole economy more productive, our gross national product per capita will rise and there will be more wealth for everyone.

Mr Charlton: Can we not invest in energy conservation anyway?

Mr Gibbons: The best way to encourage investment in energy conservation, I believe, is to raise the price of electricity. There are 10 million people in Ontario. If you want them to take energy conservation seriously, you have to make it in their economic self-interest to do so. The only way you can do that in a substantial way is by raising their price.

There are so many ways to conserve energy. There are 10 million people; there are more than 10 million ways to conserve energy. There is no way that Ontario Hydro or Mr Nixon, with the best will in the world, could possibly devise the number of subsidies, millions and millions of subsidies, to correct the damage you are doing by subsidizing electricity.

Mr Charlton: How are we going to get the right signal to the million or so people in Ontario who live below the poverty line and cannot afford to invest in any kind of energy conservation at all, unless we are going to put a global energy conservation program in place? They are the very people who, as I said, are not going to be here lobbying for it because they do not have any organizations to lobby for them.

Mr Gibbons: I suggest the government should give a tax credit to low-income people, it should tell Ontario Hydro to finance energy conservation investments and give a special rate for low-income people. Getting back to your rate structure, you might want to have an inverted rate structure instead of a declining block rate structure; for the first lifeline amounts of electricity you have a low rate, and then for higher consumption you have a higher rate.

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Mr Charlton: Those issues have all been approached with this government and it has been unwilling to move on any of them, so why would we want to put people in the position you are suggesting when there is another way of doing it? That is what I am asking.

Mr Gibbons: Because I think this is the best way to do it and it will only get done if the

government wants to do it, not if you or me want to do it. I am suggesting that if Mr Nixon wants to do it, he is going to have to do it in the way you are talking about and make it so that the poor are not hurt or it will be politically acceptable. It has to be done in a way that is politically acceptable; therefore, it will have to be by reducing other taxes or giving a rebate to people and providing energy efficiency loans. It will have to be done that way or Mr Nixon will not do it.

Mr Charlton: Let me just ask you one last question before I turn it back to the chair. Would it be fair to say, from what you have just said, that we should not increase electricity rates in Ontario by 50 per cent in the absence of a package program such as you have just suggested? In other words, we should not dump 50 per cent in the Ontario Treasury if it is just going to disappear into the general revenue fund, as Mr Nixon's recent tax on Hydro is going to do; without any specifically targeted purpose in Ontario in terms of sustainable development or energy conservation or anything else?

Mr Gibbons: It depends on what your objectives are. If your objective is solely to help the environment, the important thing is to increase the rates. If you are also concerned about social justice, then clearly you have to do something to help the poor, too. I do not disagree with you.

Mrs Sullivan: I, too, have questions and concerns relating to your concepts of investment income and the recommendation you are making in terms of government fiscal and economic policy in that area. It seems to me that to a certain extent some of the foregone revenue that you are talking about is mythical revenue. Indeed, assuming that your concept worked, ultimately your concept would be reducing the amount of electricity consumed. Therefore, the revenues would ultimately decrease and therefore there would not be the money in the provincial Treasury. It does not seem to work to me.

However, I do not want to dwell on that point too much. What I do want to talk about is your concept of sustainable development, on which I have spent considerable time. I am interested in your view of Hydro's look at sustainable development concepts not as a strategic planning approach really, but in terms of a retrospective look at calculation of costs. I would like to know from you if you know of a methodology that exists for the calculation of environmental cost that you have recommended and where you believe those costs are quantifiable.

Mr Gibbons: That is a good question. If you are very serious about sustainable development and serious about it in the way that Brundtland is, there are two messages for the energy sector. First, she is saying, "Don't build any more new nuclear power plants until you've solved the problems they entail," and second, "Reduce your fossil fuel consumption substantially because of the greenhouse effect."

I think what that implies for Ontario energy policy is, first, a moratorium on nuclear power development and, second, you have to figure out how much should we reduce our fossil fuel consumption by to achieve sustainable development. Last year, the Toronto conference on the Changing Atmosphere, Implications for Global Security quantified that second question. It said, "If you want to stop greenhouse warming, the world as a whole is going to have to cut its global CO₂ emissions by 50 per cent."

The minimum that implies is that Ontario must reduce its fossil fuel emissions by 50 per cent. I think you could actually argue that we should reduce them by more than 50 per cent because on a per capita global basis, our CO₂ emissions are much higher than the global average and we are a rich country, so maybe we have an obligation to reduce them even more.

But let's just stop at the 50 per cent. I think sustainable development means a moratorium on nuclear until the problems with it are solved, and it means we have to reduce our carbon dioxide emissions by 50 per cent.

How should that be achieved? There are at least two ways. My favourite method is a method of quotas. The government should set this target of 50 per cent reduction. It will have to be phased in, but in the long run it would be reduced by 50 per cent. Anyone who wants to sell energy that means emitting CO₂ must buy a quota from the government to emit that CO₂. The total amount they will emit will be only 50 per cent of what they are now doing. There will be this auction market for quotas.

Consumers Gas, Union Gas, Ontario Hydro, Esso, Shell, whoever wants to sell energy that emits CO₂, will have to buy a quota. They will go into the quota market and buy them and trade them, and they will only be able to sell as much energy as their quota allows.

With this quota, the market will decide how much fossil fuel and how much coal Ontario Hydro will be allowed to burn, how much natural gas Consumers Gas can sell, how much oil Imperial Oil can sell. We can let the market do it. The principles of ecology tell us how much we

have to reduce our fossil fuel. The government has to put those limits on the economy and then let the market go to it and solve the problem.

Mrs Sullivan: I do not understand why you feel that the quota system—which is not a new concept to me; I have heard that proposal before—is better than the government issuing standards for the decrease in acid gas emissions, by example, over a period of time, which are indeed, as we know, sometimes technologically difficult to achieve. Why do you not think that is an acceptable method of proceeding? Why do you feel that the quota system is a better one, when indeed that can be perceived as a licence to pollute?

Mr Gibbons: Well, at the moment everyone has a licence to pollute in unlimited amounts. This way it would be a licence to pollute, but it would be substantially lower, and therefore I would say it is better.

Why do I prefer quotas as opposed to these bureaucratic mechanisms? Maybe partly because I used to work for the government. I really do not have too much faith in bureaucrats trying to solve all our problems. The energy problem is just too complex. There are 10 million people making energy decisions, and with all the best will and the best intelligence in the world, no bureaucrat in the Ministry of Energy, where I used to work indirectly, can solve that problem and figure out enough regulations.

If you create regulations for very energy-efficient cars, people will also just drive them more. Your problem will just recur eventually. But with quotas, you can let the marketplace do it. I think the marketplace can be very efficient and it can be done at a much lower cost and with much lower bureaucracy. I think that is the flavour of the times.

Mr Charlton: I have a supplementary on this particular question. I think I understand what you are saying, but we have had a problem, for example, with the Countdown Acid Rain program, which is in effect the setting of quotas. What happened halfway through the program? We ended up demanding that the bureaucracy be beefed up for the purposes of monitoring to ensure its implementation anyway, and the same thing will happen with a quota system on CO₂ emissions. The bureaucracy is not going to go away. It is not going to save us anything there.

Mr Gibbons: No, it is not going to go away, but it will be reduced. If you have to get the bureaucrats to figure out every efficiency standard for every single energy-using device or

piece of equipment and process in the whole economy—

Mr Charlton: What will end up happening is they will have to go around and monitor every source anyway to ensure that the quotas are being met. So it is not going to solve the bureaucratic problem. I am not writing off the possibility of quotas as a possible answer, but it will not solve the bureaucratic problem, as you are suggesting it will.

Mr Gibbons: I think it will, because there are really very few fundamental energy suppliers in this province. There is Ontario Hydro, there are three major natural gas utilities and there is oil that is brought into this province at a very few locations. You can just monitor it at the border when it comes into Ontario, and it will not be a vast bureaucracy.

Mr Charlton: How are you going to monitor what the quota portion that Imperial Oil buys and sells in the marketplace gets used in terms of how much gets emitted? It depends on what I do to my automobile after I take it away from the plant.

Mr Gibbons: No, it does not, not with CO₂. With a lot of other emissions, that is true, but not with CO₂. It is fixed by the amount of gasoline you buy.

Mr Charlton: No, it is fixed by the amount of gasoline I consume.

Mr Gibbons: I think they are largely the same.

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Mr M. C. Ray: I am fascinated by your simulated free-enterprise system there. It intrigues me. Your position is senior economic adviser with the Canadian Institute of Environmental Law, is that correct?

Mr Gibbons: And Policy.

Mr M. C. Ray: And Policy. I take it you are an economist.

Mr Gibbons: That is right.

Mr M. C. Ray: I am curious to know for whom you speak. Did this brief get presented to some other board or body of the Canadian Institute of Environmental Law and Policy and receive some kind of approval, or do you speak in your own capacity?

Mr Gibbons: It was approved by the other members of the staff of the institute. The institute is a small organization. It does not have a vast membership like Friends of the Earth, Pollution Probe, Energy Probe or organizations like those. We are a small group or a think tank. I do not

claim that I have a mandate. I have not been elected by anyone, as you have.

Mr M. C. Ray: I ask that because there are a number of us here who are not sympathetic to what I have termed the simulated free-enterprise pricing system for a public corporation. Mrs Sullivan has called what you call a subsidy "mythical lost revenue."

I was just curious to know how we derive Canadian policy from this organization through this brief or what Canadian policy it is that you are attempting to present to us. I do not know why you want to go through this exercise of generating \$3 billion for the purpose of turning it back. What economic analysis have you done on the investment impact of such an endeavour in Ontario in terms of capital investment, promotion of industrial development and commercial development in this province?

Mr Gibbons: It is our position that it will increase it because it will make our economy more energy-efficient. There are many ways to meet our energy needs. Electricity is only one of them. Electricity is a good thing, but you are going to have too much of it; and we are basically saying we have got to the point where we have too much and on the margin it is cheaper to meet our incremental needs by energy conservation than electricity. We should have prices that reflect that fact so people will choose the options which are cheapest for Ontario as a whole.

Mr M. C. Ray: Was an analysis done of the economic impact that the \$3-billion increase in hydro rates would have in this province?

Mr Gibbons: If you mean, do we have a large-scale computer econometric model of Ontario, no.

Mr Brown: I have a quick supplementary. It seems to me that the economic models must exist. There are lots of jurisdictions that charge 50 per cent more for electricity than we do.

Mr Gibbons: Yes. In countries like Japan and West Germany they have very high rates.

Mr Brown: I think you just have to go across the lake where I think you would find those kinds of numbers. Is the American experience in New York, for example, that much better? Are they better at conserving electricity than we are?

Mr Gibbons: I am not familiar with the statistics for New York. I am more familiar with West Germany and Japan, which have very high rates of economic growth. Their electricity consumption on a per capita basis is much lower than ours.

Mr Brown: Are we talking 50 per cent in those countries?

Mr Gibbons: Fifty per cent lower?

Mr Brown: No. Are we talking 50 per cent more in terms of rates?

Mr Gibbons: I think it is at least 50 per cent more. I have not checked the numbers recently but the last time I looked it was very substantial.

The Chairman: Thank you very much, Mr Gibbons, for coming in and speaking to us this afternoon and for the discussion that we have just had.

Members of the committee, I understand that we have to set up some technical support for the next presentation. In order for that to happen, I will adjourn the committee for five minutes.

The committee recessed at 1515.

1524

The Chairman: I call the committee back to order. Our next witness is the Ontario Natural Gas Association. The delegation should come forward and introduce themselves for the benefit of Hansard. We have about 60 minutes for your presentation. It would be nice if we could have some time for questions from the committee. With that, I will turn the floor over to the delegation.

ONTARIO NATURAL GAS ASSOCIATION

Mr Pinnington: My name is Paul Pinnington and I am the president of the Ontario Natural Gas Association. Accompanying me is Bernard Jones, who is a consultant with the association. He, in conjunction with the association's members, was instrumental in bringing together the documents we are presenting to you today. We thank you for the opportunity of appearing before his committee and of participating in the deliberations regarding the amendments to the Power Corporation Act. On behalf of the members of the association, we have prepared a brief entitled Electricity Demand/Supply Planning in Ontario, a copy of which I believe has been distributed to each of you.

Mr Jones has prepared an overview of this brief and he will take us through that overview. I expect this can be done with reasonable dispatch, so that we can spend a fair amount of time on questions. Copies of the brief have been provided to the committee. With your concurrence, Mr Chairman, my colleague and I would respond to questions at the conclusion of the presentation, if that is convenient.

The brief has been provided to the clerk and a representative of Hansard, and additional copies have been made available to the guests in this room. I will ask Mr Jones to proceed.

Mr Jones: Good afternoon, ladies and gentlemen. This is a brief summary of our presentation, which we will make on slides. It focuses on the policy aspects of Bill 204 and not with the administrative detail of the bill. It is a kind of a broad-brush look at some of the implications of the legislation.

It might be helpful if we began by running through the main recommendations that we are making and the following slides will explain why we think these recommendations are important.

Very briefly, the recommendations are:

1. That there should be speedy passage of Bill 204;

2. That there should be a reconsideration of the economic and development objective contained in the memorandum of understanding which is a companion to the bill;

3. That there should be early public review of avoided costs and the establishment of appropriate buyback rates for parallel generation;

4. That the public review which is planned should be done by the Ontario Energy Board;

5. That there should be close monitoring of progress in implementing parallel generation and economic natural-gas-fired electricity generation;

6. It is our feeling that if progress in implementing parallel generation is slower than warranted, an independent body should be appointed to implement the government's policy.

Why the speedy passage of Bill 204? As the committee well knows, Ontario faces imminent and far-reaching decisions on electricity demand and supply alternatives. The bill that is before you makes Ontario Hydro more responsive to government policies and public priorities. ONGA supports this direction or thrust.

There are several recommendations which reflect recommendations that have been made by the select committee and other parties. The legislation also marked significant progress in clarifying the respective roles and responsibilities of Hydro and the government in electricity policy and planning. It begins to overcome some of the barriers that have been talked about in the past by numerous groups; barriers of perception, of information and of attitudes. So we see it as a good start.

The government may now make policy statements, as you know, which would be binding on

Hydro and there would be a new system for more timely consultation and reporting. The government can require Hydro to submit its plans and reports for review, and it will be required to provide a long-term strategic plan and a short-term operational plan.

Another feature of the new reporting and consultation is of course the Hydro committee of key ministers, chaired by the Premier (Mr Peterson). The plan, as we understand it, is that this committee would meet with Hydro senior executives at least four times a year to discuss issues and solutions to problems.

Furthermore, we were pleased to see that an agreement has been reached by the government and Hydro on acceptable common objectives. We have a problem with one of these objectives, which we will discuss. We were also pleased that in future all supply options are to be given equal consideration in electricity planning. Previously, we felt natural gas was not given equal opportunity to compete. We feel that the passage of the bill will improve public confidence that the government will develop appropriate electricity demand/supply policies and that Hydro will implement those policies.

In some respects, the changes did not go as far as we had suggested, but as we see it as an industry, we feel it looks like a reasonable compromise and certainly has a reasonable chance of working, provided there is goodwill on the part of the parties involved and there is also the political will to make the policy work. We also feel it shows that the Ministry of Energy has given pretty careful thought to the issues involved and also to the recommendations of the select committee. We are pleased with that.

1530

Looking now at the common objectives of Hydro and the government, it is useful to see the objectives stated as they have been in the policy statement and the memorandum of understanding. The primary objective, which everybody knows of course, is to secure reliable electricity supplies at the lowest feasible cost over the long term, an easy statement to make but difficult to implement.

The government and Hydro have agreed on several other objectives which you will be familiar with.

Conservation and wise use: It is our feeling, of course, that conservation and wise use should be ongoing priorities. It is actually in a time when you have favourable energy markets that, in principle, you should be able to make the greatest gains or the most economic gains in that area. It is

true that sometimes you need strong price signals before people become excited to save electricity, but the reality is that it is cheaper to do conservation before prices start to accelerate and you get bottlenecks in the economy, in supplies, materials and services.

There is also an objective which I talk about underneath this, which is the environmental objective Hydro has. Its energy policy should be compatible with environmental protection. Clearly, ONGA has been very concerned with that as a priority, and we feel the industry can make a substantial contribution in helping to address those problems.

We were pleased to see the recommendation in the select committee report that there should be some kind of streamlined process for the review of parallel generation projects, for example. We felt that was an important contribution and we were pleased also to note that there is now an interministry committee, we believe, looking at that problem. We have indicated our willingness to work with the ministry.

Another goal is to optimize the use of the existing system, and we agree with that objective. We have put before the committee and others options for using natural gas to upgrade existing facilities, to increase energy efficiency, to reduce pollution and to diversify fuels and technologies. The select committee itself has recommended that repowering by natural gas be considered for some existing facilities.

For the moment, I will pass over economic growth and development.

Public accountability and responsiveness: I think everybody would share the hope that this objective will be reached and that we will get more of that as time goes on.

Renewable resources: There is a statement that there should be cost-effective use of renewable resources. We support that. All resources should compete, in our opinion, on a cost-effective basis so that renewable and nonrenewable resources will be competitive with each other.

Involvement of native groups: We support that as we do the involvement of any groups that have interests in electricity supply and demand policy.

Private sector participation: It is our belief that without private sector participation Hydro will not be able to reach its primary objective. The potential problems that have been outlined over the next two decades and that the committee is aware of, would make it very difficult for Hydro to meet large increases in demand without being able to draw upon private sector support and parallel generation and cogeneration. We think

that last objective is clearly one that needs pursuing.

We feel the objective of spurring economic growth and development merits reconsideration. We are not quite sure what it means. The policy statement talks about spurring economic growth, regional development and so on. I know it is a great concern to all parties in the House that the Ontario economy continue to be strong and healthy. We have a concern that if economic growth and development objectives become a kind of integral part of Hydro's mandate, there could be confusion of Hydro's corporate policies.

In the past, say through the BILD program in 1980, the government had electricity development as one of its major platforms. In the mid-1970s there was a time when the province slowed down or accelerated the capital spending program of Ontario Hydro for economic effects.

To us, it seems that the best way Hydro can stimulate economic growth and development is by pursuing its primary objective. If Hydro pursues its corporate goals, it will in fact stimulate, to the maximum degree possible, economic growth and development, and that is a lot clearer signal. So we would like to see that objective reviewed and reconsidered. It may not be necessary to have it in the bag of tricks.

As you know, I have mentioned that Hydro is required to provide a long-term strategic plan, and this is to include targets for conservation and parallel generation. We feel this is an important step forward. To us, it represents a test case.

As you know, in the summer, the government announced the parallel generation policy. This policy is in fact the first of a series of policy statements the government envisages making to Hydro, and it requires Hydro to do certain things. In this case, it requires Hydro to advance its target dates for implementing parallel generation and doubles the target amounts that are to be brought on stream.

As the statement indicates: "The policy reflects the importance we place on parallel generation.... It offers low-cost, low-risk, environmentally sound electricity generation."

Pardon me; a technical hitch here. Bear with me one second. I will not try to read off the other slide.

What the slide indicates is that Hydro still has the gatekeeper role in parallel generation. You have heard a lot about that, Hydro's overall control of the parallel generation process. That is why we feel that this government policy is so important. It provides a foundation upon which

parallel generation can be built, and there is direction given to Hydro, which is needed.

As well, there should be close monitoring of the progress that is made in achieving parallel generation. As I mentioned earlier, we feel that if, after 12 to 24 months, there is less progress than warranted, then in view of this gatekeeper role, the creation of an independent body should be considered to actually implement parallel generation in line with the government's policy objectives.

Looking at the advantages of parallel generation—again, this is something that committee members will be familiar with—the government has identified these kinds of benefits, which we have certainly laid out in the past. Parallel generation will produce a more secure electricity supply. It would be relatively less polluting. It would have shorter lead times and lower capital costs. It would create new jobs and businesses, especially in the north, and it would create an indigenous and exportable industry. These are all significant advantages of parallel generation which summarize its economic impact.

There are uncertainties and risks with all supply options, whether it is nuclear, coal, small hydro or parallel generation. However, the parallel generation risks are manageable, and I think the select committee reached much the same conclusion. To quote from its policy statement:

"The government believes that most of these risks"—associated with parallel generation—"can be greatly reduced," and "are likely to be manageable and are outweighed by the potential benefits."

It is also worth noting that parallel generation, even after achieving 2,000 megawatts, say by the year 2000, would be a relatively small portion of the total system. I think the minister anticipated that it could reach 10 per cent of the total electricity supply. Of course, 10 per cent is much higher than today, but in the context of the other supply options it is still rather minor.

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Finally, the major portion of power generation would use natural gas and natural gas technologies, which is one of the reasons that ONGA is here today.

We feel that further steps are required. Bill 204 is one step, the parallel generation policy is another step, and we feel that further steps are required. Just briefly, before talking about those steps, I want to review the positive aspects of that new policy, because they are important. It sets higher targets for parallel generation policy

which are needed. It allows for public review of the avoided costs and buyback rates. It establishes a solicitation process for parallel generation projects. It would allow no discrimination among fuels and technologies in the development of parallel generation. It would set reasonable technical standards. It clarifies the role of municipal electric utilities; in effect, putting them in the position where they could not be a barrier to the development of this fuel alternative. There is a recognition that arbitration may be required in the event that Hydro and parallel generators reach some kind of impasse on any particular project. So all of those things we feel are important.

As for the further steps, we feel there should be, as I mentioned earlier, public review of the avoided costs. The government should move as quickly as possible to see that appropriate buyback rates are established; the select committee had recommended a benchmark rate to encourage the establishment of a viable and healthy industry.

Finally, there should be consultation on a range of other matters which are very important to the development of parallel generation.

To sum up, we feel that we would encourage, at least, the speedy passage of Bill 204. It is a foundation on which the committee and the government can build. Ultimately the success or failure of the policy in the bill will depend on the commitment and goodwill of the parties and, as I have said, the political will of the government. ONGA is ready to do its part as an industry and we feel that Bill 204 is a good step forward.

We feel as well that there should be the reconsideration of the economic and development objective. We would urge early public review of avoided costs. We feel that this must be a broadly based review because there are so many factors, economic and social, to cover. We feel as well that the public review would best be done by the Ontario Energy Board. We note that while both Hydro and the government are obviously committed to parallel generation, the government is more committed at the moment and has raised Hydro's targets.

So we feel that it would be wise to implement some close monitoring of progress made. Finally, as I said before, if progress is not up to par, then there may be a need for an implementing body which is independent and which could review the situation and recommend new policies to government and then move about implementing the parallel generation.

That concludes the presentation. Thank you.

Mrs Sullivan: I appreciated the time that you put into the brief. I see it as a natural follow-up to the presentations which ONGA made to the select committee last summer when we were looking at the DSPS. I wonder if you could expand on the buyback rates, as we are talking about the buyback rates and you put some emphasis on those. We know, of course, that the government has committed to a committee or a study group to look at the avoided costs and so on and we all are certainly looking forward to the actual establishment of that committee.

On page 24, I wonder if you could just expand on this. I see a bit of a conundrum here. You indicate: "The buyback rates available to private power producers will influence not just the volume of electricity supplies developed by the private sector, but also the technologies which may be employed."

On page 23, the fourth bullet, you indicate that you believe there should be "no price discrimination based on fuels or technologies used in parallel generation." I am wondering if there is almost a dichotomy between those two statements.

Mr Jones: I think all we are trying to say there is that the choice should be neutral, it should be based on economics. Whatever the dichotomy that might appear, that is exactly what we are trying to say. Depending on the rate at which, for example, you could recover capital, the relative capital and operating costs, the ratios that you have in there, the availability of the technologies and the rate at which you will be prepared to invest in new technologies are all going to be affected by the buyback rate.

Mrs Sullivan: The other aspect I want you to pursue a little bit as well is a bullet point, also on page 23: "clarification of the role of the municipal electrical utilities." In your remarks, you indicated that you felt they should not become a barrier to the development of parallel generation. Have you found the municipal utilities to be a barrier? The association is going to be in, I think, tomorrow, is it not? We might want to pursue it with them if you wanted to comment on that, if you have had examples or problems.

Mr Jones: We have at the moment no evidence that they are a barrier. I guess there was some concern, simply because they were potentially interposed between Hydro and the parallel generator developer; that every time you add another layer of responsibility and accountability you can get additional layers which would frustrate your efforts to move projects along

relatively quickly. The reality is that I guess it would depend on each individual situation. I imagine that a lot of local utilities would be delighted with new projects that were economic, particularly if they helped, say, local industry. Why would they not be?

We were concerned initially that the role of the municipal electric utilities was not well defined. It had not been thought out. Nobody had studied the question. We did not know exactly where they fitted so we just said: "Don't forget about them. They're important." But we would be interested to hear what they think.

Mr Pinnington: I would like to add one quick item to that. I think one of the other considerations with respect to municipalities is that there are quite a number of technical considerations involved in the process of hooking power into the grid, and there were concerns that a single standard be set for Ontario and that we did not have a situation where you had, whatever it is, 340 municipalities all with different standards under which an entrepreneur might be expected to perform in putting in a cogeneration facility.

Mr Charlton: I would like to go back to the first question which Mrs Sullivan asked you, her reference to the last sentence of that top paragraph on page 24, "The buyback rates available to private power producers will influence not just the volume of electricity supplies developed by the private sector, but also the technologies which may be employed." Perhaps you can tell me if my understanding of what I am reading there is what you are essentially saying, that if the buyback rate remains unrealistically low, as it presently is, the only parallel generation we may see is small hydraulic and the burning of garbage.

Mr Jones: It is quite possible.

Mr Charlton: Pursuing the question of the buyback rate and the question of avoided cost, it was interesting that you referred to the select committee's recommendation about setting a benchmark rate. We are at a logjam on that issue right now, and I agree with your comments and your recommendations here that we proceed quickly through a public review and that the review happen at the OEB.

I agree with you on that, but I would like your comments on some of the issues that will obviously arise at that hearing, because I think it is important that we start better to understand the issue of avoided cost and the buyback rate as we move into the future. The logjam we have presently is that Hydro is essentially saying it does not disagree with most of us about what

avoided cost really is. The problem in 1989 is they do not need any power; therefore, what is avoided cost in 1989?

1550

If they needed power and were therefore in the process of costing the generating facility to provide that power, then avoided cost would be the cost of the power out of that generating facility they are in the process of planning.

As a committee, as a government and in the review process, ultimately we have to get over that gap between where we sit in 1989 and where we find ourselves in 1992, just three short years down the road, when all of a sudden they are going to be screaming, telling us they now need power but it is too late to bring on the power fast enough from parallel generation and efficiency and they therefore have to build the next nuclear plant.

Is it your view that what has to be available now and what always has to be available as avoided cost is that which we will avoid by bringing parallel generation or conservation into the system now? In other words, regardless of whether we need that next plant now, Hydro has already told us we are going to need it soon and therefore whatever we are bringing into the system now as alternatives is avoiding that next plant and therefore that is the cost that should be the ceiling up to which we are prepared to pay.

Mr Pinnington: It is an extremely complex topic, not something one answers swiftly but just a few of the items that we see involved in establishing the question of cost. Certainly, the whole question of nuclear power cost needs to be re-examined. We think that included in buyback rates should be considerations with respect to transmission, because you can put small cogeneration facilities in the north and save having to move power great distances so there are some significant efficiencies and costs.

Mr Charlton: That is not only true in the north; that is true here too.

Mr Pinnington: Certainly, and it is as well. We mention the north as a particular area. The environment, which was mentioned earlier, is a very important one with natural gas, in particular. There is very significant reduction in acid gas, CO₂ and particulates. Therefore, you do not have to put on scrubbers. These are savings to the public in terms of cost of electric power. We think they should be considered.

As to the efficiency of the process, as a previous speaker mentioned, natural gas is very much more efficient than coal in the manufactur-

ing of power, so there are savings there and we think those should be considered.

Timing, which was the tail-end, I think, of your observation—

Mr Charlton: It was the primary part of my observation.

Mr Pinnington: Hydro continues to tell us that a nuclear facility is 12 to 15 years to put in place so decisions must be made today. The reality is that you could put cogeneration in probably six months from now. These are package units that are available from General Electric, a case in point, that you can just literally plug in and start to operate. Those are, just off the top, some of the considerations we think need to be—

Mr Charlton: Let me just try to focus the last part of what I wanted to get out of you. All of that I am glad to hear.

Any power, whether it be conservation—negawatts, as some like to call it—or whether it be parallel generation or industrial cogeneration or whatever the case happens to be, whether it is produced by natural gas, by water, by recaptured waste heat in a large industrial mill, any power we are bringing into the system now which ultimately is going to displace the need for the next nuclear plant which Hydro is talking about, which it does not need now but it will have to plan for soon, what should be the price we are prepared to pay for that power in 1989 if that power ultimately is going to avoid the next nuclear plant?

Mr Pinnington: Are you asking me for a number right today?

Mr Charlton: Not a number. Should we be paying the avoided cost that is associated with that next nuclear plant in order to get that power now so we can avoid it?

Mr Jones: These are clearly the issues that this independent review will have to look at.

Mr Charlton: What we want is your opinion on that issue as the Ontario Natural Gas Association.

Mr Pinnington: I think we should be careful to say one thing. The natural gas industry is not primarily antinuclear. The reality is that nuclear power is an extremely important element in the supply of electricity to Ontario.

Mr Charlton: I will be very frank with you. I am not particularly antinuclear either. My party has taken an antinuclear position for two reasons. One, we have not yet resolved the waste question. If we resolved the nuclear waste question in Ontario and we also felt that it was the

most economic way to go, you would not find a lot of nuclear opposition from my party as well. Having said that, neither of those situations seems to be true, both in terms of what you are telling us in your presentation here today and what we know about the cost of conservation.

Mr Pinnington: Our position is that in the immediate term there is a need for power. Natural gas can be used in that application. Cogeneration is a very major contributor.

Mr Charlton: Let me put the question to you another way so we can get something a little clearer on the record. How much parallel generation in natural gas would we get in Ontario at seven cents a kilowatt-hour?

Mr Pinnington: A whole pile.

Mrs Sullivan: I have a question relating to the timing question. I was interested in the response to some of Mr Charlton's remarks, but I wanted to go back a little to the very exciting cogeneration project at Boise Cascade. As I recall that situation as it emerged, Hydro was on side, Boise Cascade was on side, and the problem was the longer-term supply at a guaranteed rate of natural gas. That is what really held up that project coming to fruition. Certainly everybody was on side and that was the holdup, as I understand it.

Mr Pinnington: None of us have access to the contractual arrangements to that agreement that exist between the parties, but I would suggest to you that there is no question whatsoever about the secure, long-term supply of natural gas. Physically the volumes are clearly there. My understanding is that the difference in opinion was the mechanism one employs to establish what the price is going to be in years 2, 3, 4 and 5. It was a question of pricing and the terms of the contract of that pricing, but certainly not the question of the availability of the gas itself.

Mr McGuigan: My question relates partly to Mrs Sullivan's. It is certainly not about the supply—we know we have the supply in western Canada—but the ability to deliver. I have no problem at all with package units of parallel generation coming in to supply specific needs. But when we talk about repowering some of our plants to natural gas, I have a few problems with that because we are running into a lot of difficulty today with transmission lines.

A lot of challenges are out there. There are going to be increasing challenges to the magnetic fields. We are running into a lot of challenges and problems with the quality of electricity. Our computers and sophisticated equipment today require better quality in electricity than we are

providing. According to the people who make this point, we are constantly making that quality worse with the type of equipment we are constantly adding to the load.

This brings me to the point that I am wondering if we are not better off delivering the energy through a natural gas pipeline to the customer, rather than through Hydro lines. It certainly is no picnic, but it is relatively easy to put in a natural gas pipeline as compared to putting in new hydro lines. You can do it without disrupting the countryside as much as is required with those overhead lines. I am just wondering about the wisdom of using natural gas as a basic supplier of energy through electricity as compared to delivering a product to a customer. I just wonder what your thoughts are on that.

1600

Mr Pinnington: We certainly feel that there are applications for natural gas which are primary applications, as previous speakers have probably indicated. We feel that residential heating, for example, is a far superior use of natural gas than electricity, so to that extent there would be less demand on the electrical system. We also feel strongly that hot water heating, in the residential again, as an example, is probably a better application for natural gas than electric power.

I am not in a position to comment about questions of the environment surrounding high-voltage transmission. I am not skilled in that regard. With respect to electricity quality, I would think that is really primarily a matter of the technical equipment that is employed. I think maybe the problem that you might be referring to is fluctuations in voltage that cause problems.

Mr McGuigan: I am not skilled in it either, but I am just pointing out that there is a—

Mr Pinnington: These are mechanical questions that I think Hydro would be prepared to respond to, but certainly, there are preferred applications that would reduce the need to put in additional transmission facilities. Again, as was mentioned earlier, cogeneration is site-specific, so that then reduces the need to put in additional transmission facilities as well.

Mr McGuigan: You might be interested to learn that last summer I converted a 100-horsepower irrigation pump to natural gas from gasoline. Our costs are one third our previous costs. I am a big booster of natural gas, but I guess I am showing a little bit of jealousy as to the use of natural gas, wanting to see it put to the best possible use.

Mr Morin-Strom: I wonder if you gentlemen could comment on the position we have heard from some of the environmentalists before the committee who have recommended that one of the best ways to spur energy conservation is to drastically increase the prices that Ontario Hydro charges its customers; in particular, the suggestion that prices should go up by 50 per cent. What would your reaction to that be?

Mr Pinnington: I guess we are basically free-enterprisers in the natural gas industry in Ontario and there is probably always an uneasiness about artificial pricing mechanisms, if that is what is being referred to. I think we would probably far rather approach the question of higher prices for electricity from the point of view of whether Hydro is charging a realistic cost for electric power.

Mr Morin-Strom: This was their point. The point of the presentation by the Canadian Institute for Environmental Law and Policy—and I think a similar position is held by Energy Probe certainly—is that in fact the full economic environmental costs are not being reflected in Ontario Hydro's pricing structure, and there are tremendous subsidies coming from the public into electricity costs. You are saying from the standpoint of free market enterprise that you want a certain point of view. I think you want to have the full cost absorbed. If in fact there is tremendous public subsidy into electricity cost, do you think that is appropriate?

Mr Pinnington: I do not have a problem with the front end of your statement, which I understand to be that if there are additional costs for scrubbers or what all to protect the environment, those costs should be reflected in the cost of electric power. Where I did have some difficulty—and unfortunately I did not witness all of the previous speakers' presentations, but what I did hear sounded somewhat arbitrary in terms of a half again, or 50 per cent, increase—was with setting the price of electricity for punitive reasons. I think the preferred route to go would be to charge what it costs. I expect if you did that, the price would go up.

Mr Jones: It could be quite difficult to explain it to the public.

Mr Morin-Strom: Yes. It is not a position that our party particularly supports, although there is a growing movement, I think, within the environmental movement, to say that a lot of costs are not being reflected in energy prices generally, particularly in this case, in electricity prices.

The other thing I would like to ask about is: You comment on the reference in the memorandum with Ontario Hydro with regard to spurring economic growth and development. I have not heard a detailed clarification of what that refers to, but I think generally, for those of us from northern Ontario, we have our clear understanding of what it refers to. It refers to regional economic development and taking away some of the inequities in terms of electricity rates, which are a lot higher in northern Ontario than they are in southern Ontario, and to the need for Ontario Hydro to be used as an economic development tool in disadvantaged areas of the province, both in terms of rates of electricity, particularly the smaller users in comparison to large users in the south, and of stimulating new developments, whether it is in cogenerating plants or in small-scale hydraulic plant development in northern Ontario, which could be a real benefit to the northern economy.

So, to me, there seem to be very, very legitimate political reasons for wanting to try to protect and stimulate some economic activity in an area of the province which has been generally disadvantaged. I do not understand why you would object to that kind of language being included in the legislation.

Mr Jones: We certainly would not object to the kind of thing you have been talking about: stimulating the north. But the question is about the instruments that one uses. The government presumably has a range of instruments at its disposal to stimulate the north and to provide subsidies, if they are required.

I guess what we were saying is that we are not sure that Hydro, in its pricing policies or incentives, should be a mechanism; that perhaps it puts an unfair burden on Hydro. If you go down that road and you have incentives and subsidies, then where do you draw the line? What are Hydro's expectations about the kinds of pressures that could be put on it in the future? I guess the government has tax policies and it has expenditure programs. There are a lot of programs, as I understand it, that do assist the north.

Mr Morin-Strom: One of the problems, though, is that it is not a matter of subsidies and assistance to the north. When it comes to energy costs, it is exactly the reverse. We do not get any subsidies. We pay a penalty in the north because of the costs of electricity, home heating oil, oil and gasoline in northern Ontario, and then the distribution costs for many of those products are a real penalty to industry in northern Ontario

compared to southern Ontario. To try to equalize the input into industry, I would see Ontario Hydro as being a public corporation: a very appropriate vehicle for the government to use to step in and equalize the cost of manufacturing or of operating plants or transporting goods.

Mr Jones: It is a point of view. I would be interested to know if it shared around the table.

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The Chairman: Mr Brown, did you have a supplementary? I can see we have another northerner who may want to comment as well.

Mr Brown: A supplementary to Mr Morin-Strom: I am not very sure that northern Ontario rates are any higher than those in southern Ontario within the network of Ontario Hydro.

Mr Morin-Strom: You should talk to members up in Lake Nipigon.

Mr Brown: Rural rates are of course higher, as they are in southern Ontario, than you find in the municipal utility field. I think what we are talking about, what I am very in favour of and what I think what the legislation is talking about—I would like your comments on this—is the opportunity to compete using hydro—we know the province of Quebec and the province of Manitoba have unbelievably low rates for certain industries such as pulp and paper or whatever in certain instances. We want the ability to use hydro to compete for those kinds of industries within Ontario. That is my view of what we are talking about. It is to be able to compete with competing jurisdictions for products and plants.

Mr Jones: If that is the case, it is illuminating.

Mrs Sullivan: If I could just add to that, if you look at the Premier's Council's report, there is an entire section on the use of Hydro as a vehicle of economic development. I think there was a lot of concurrence when that report came out. Clearly, one of the emphases in that report was on the development of new technology and the international market that would be opened up to us through use of the expertise of Ontario Hydro. All of those figures fit together for a stronger Ontario.

Mr Charlton: One very brief last question: It goes back to the recommendation you made about the Ontario Energy Board doing the review on avoided cost and the buyback rate. Specifically, as you are aware, the select committee recommended three years ago that Ontario Hydro should be regulated by the Ontario Energy Board. The primary members of your association are directly regulated by the OEB, as opposed to Hydro which has to through a review each year.

First, is it your feeling that the OEB process has served your industry fairly well? Second, should Ontario Hydro be subject to the same kind of independent regulation that the gas companies are?

Mr Pinnington: I think the consensus in the industry is certainly that the OEB process has served Ontario, the consumers in the province and the gas industry in the province very well. I think the process is very efficient and very thorough and has worked very well.

Whether Ontario Hydro should be subject to a similar process, I think begs the question of very significant differences in the structure of a Consumers' Gas, Union Gas or Inter-City Gas. These are privately owned entities and they report to a board of directors. They have shareholders and they declare profit. For that reason, the Ontario Energy Board scrutinizes their activities to ensure fairness to the consuming public, because of course at the same time they have monopoly franchise marketing arrangements. Ontario Hydro does not declare a profit. It does not have shareholders to the extent that people are buying shares and that there is a risk involved in those shares.

Mr Charlton: Obviously, the conclusions the OEB would have to base its decisions on each year would be somewhat different. But what raised the question in my mind and why I thought to ask it was the comment that came from one of you earlier—I cannot remember which one of you it was that made the comment, unfortunately—that although you were not sure, that a 50 per cent price increase was pretty arbitrary and perhaps did not reflect anything real, if the total real cost of electricity were being charged by Hydro, there would be a price increase. I think one of you said that. If Hydro were appropriately regulated in the way you are, so that all of the facts ended up on the table, would it not resolve that problem?

Mr Pinnington: "Appropriately regulated" is where I have a problem because you have to have one body responsible for Ontario Hydro. It is either the board of directors of Ontario Hydro as it presently exists or the Ontario Energy Board.

Mr Charlton: Do you not have you have both?

Mr Pinnington: To the extent that the Consumers' Gas board of directors makes a decision and that decision is then reported to the board, the board can subsequently say, "It was a good decision and you can have 12 per cent return," or, "It was a bad decision and your shareholders will now lose two per cent," or

whatever the number is. There is a risk and a penalty involved for nonperformance.

In the case of Ontario Hydro, the board of directors is put into place by the Lieutenant Governor in Council, by cabinet. These are appointed people and in the decisions they make, their principal responsibility is to cabinet. How can you have the Ontario Energy Board turning around and saying: "Don't do that. Do this"?

Mr Charlton: Is not their principal responsibility to cabinet as well?

Mr Pinnington: You have a conflict, do you not, just in the basic structure of Ontario Hydro? I do not see how you can have Ontario Hydro accountable to the Ontario Energy Board as well as to the board of directors.

Mr Charlton: The ultimate accountability of Ontario Hydro is to the crown.

Mr Pinnington: Yes.

Mr Charlton: The Ontario Energy Board is an agency of the crown. I do not see any conflict there any more than with the Workers' Compensation Appeals Tribunal hearing appeals of decisions from the Workers' Compensation Board. They are both crown agencies.

Mr Pinnington: Who has primacy in the decision-making process then, if you have the Ontario—

Mr Charlton: The primacy goes to whomever you give it to in legislation. That is what my question relates to.

Mr Pinnington: If you give it to the Ontario Energy Board, then you might just as well relegate the board of directors of Ontario Hydro to basic a operating function. I am not trying to be argumentative. I am just suggesting to you that in the way the system is now set up, you probably cannot have Ontario Hydro, in the regulatory capacity it is in, with the natural gas utilities.

Mr Charlton: What does the board of directors at Consumers' Gas do?

Mr Pinnington: I am sorry?

Mr Charlton: What has the OEB-relegated Consumers' Gas board of directors to?

Mr Pinnington: The board of directors, for example, of Consumers' Gas makes decisions relative to that private entity. It has a responsibility to shareholders, to the people who own shares in Consumers' Gas. It makes decisions and then it is obliged by law to report its entire process to the Ontario Energy Board. The Ontario Energy Board then says: "You are astute in the decision-making you made. Fine. Carry on," or, "You



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Hansard

Official Report of Debates

Legislative Assembly of Ontario

Select Committee on Energy

Power Corporation Amendment Act, 1989



Second Session, 34th Parliament

Wednesday 27 September 1989

Speaker: Honourable Hugh A. Edighoffer

Clerk of the House: Claude L. DesRosiers

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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Wednesday, 27 September 1989

The committee met at 1014 in room 228.

POWER CORPORATION AMENDMENT ACT, 1989 (continued)

Consideration of Bill 204, An Act to amend the Power Corporation Act.

The Chairman: Could I call the meeting of the select committee to order, please, and ask everyone to find a seat? Our first witness this morning is the Municipal Electric Association. I see the delegation is already seated. Perhaps you could introduce yourselves for the benefit of Hansard, and then we have an hour for your presentation, to be divided as you wish.

Mr Anderson: I was just trying to put the lights on, Mr Chairman. I just put on the wrong one.

The Chairman: You have about an hour for your presentation. It would be helpful if you could leave some time, though, for questioning from the members. I will turn the floor over to you, Mr Anderson.

MUNICIPAL ELECTRIC ASSOCIATION

Mr Anderson: Thank you. I am Carl Anderson, chairman of the Municipal Electric Association, and with me this morning are three of our staff people. At the far right is Kim Anderson; Tony Jennings, our chief executive officer, and Charlie Macaluso.

We have a verbal presentation. You have received a written presentation, and we have some slides to go along with the verbal presentation.

I would like to apologize for our president, Carl Kropp of Ottawa, who was not able to be here today. We have just had a five-day board of directors' meeting in the minister's riding of Thunder Bay. We were back from that last night, and he, unfortunately, had a fatality in the Ottawa system last week. He had to go back for a number of reasons and could not be here, so we apologize for his absence today.

For most people living in Ontario, when they think about their electricity supply, they most likely think of their local hydro utility; for example, Oakville Hydro, Durham Hydro or even North York Hydro. I see our member is

missing this morning. These 316 member local utilities were established in accordance with the Public Utilities Act and the Power Corporation Act. They are responsible for the distribution of electricity to over 70 per cent of the electricity consumers in Ontario.

A number of these utilities generate some of their electricity themselves. With one exception, that being Sault Ste Marie, they purchase electrical power and energy from Ontario Hydro. There is a co-operative partnership among the municipal electric utilities, the municipalities, the provincial Legislature and government and Ontario Hydro, and that has been the success to Ontario's energy story, as we see it.

Since the end of the Second World War, this province has enjoyed phenomenal and sustained economic growth that provides its growing number of residents with a standard of living that is the envy of the world. Certainly, at the World Energy Conference last week in Montreal, you begin to see the great advantages of living in a province like Ontario, with its reasonable sources of power.

That growth we are talking about continues today, and the need for electricity continues to grow, not only here but around the world. In recent years that demand for electricity has outstripped the expectations of those who based their forecasts on the slow growth that was experienced in the early 1980s. This growth is occurring at the same time we are increasing our energy efficiency, and that is very important to note. Even though we are getting better at it, we are using more of it.

The load is growing not because people are not conserving energy; they are conserving energy. It is growing not because new technology is not efficient; we are seeing that it is becoming more efficient. The electricity demand is growing in this province because the population and the economic strength of Ontario is growing.

Continued growth in the 1990s is going to take place with a firm commitment to protection of the environment. One of the most important things to discuss in terms of the future is the environment. I do not care where you are in the world, this is the key issue of using power today. Everyone, in our way of thinking, will have to become a Green. Ontario is indeed fortunate that with its

Candu generation system we can produce quantities of electricity that do not produce SO_2 , NO_x or, of growing concern, CO_2 ; also, that in the production of it, there is no methane gas given off, there are no carbon monoxide gases given off and there are no other gases given off. It does produce the solid waste, but it is manageable at present and can be stored safely for long periods of time into the future.

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It is our opinion that this waste can be stored for ever, quite easily, and it is just a political decision of where to store it. It is not a matter of how to store it; it is a political decision that needs to be made at the federal level to store it.

Ontario's municipal electric utilities, as the organizations closest to the electricity consumer, bring a unique perspective to this review by the select committee on energy of this Power Corporation Act. Together with the Public Utilities Act, it forms the legislative underpinning of the supply of electricity in Ontario.

Therefore, the Municipal Electric Association has a very special interest when change in this legislation is contemplated. In our submission we make to you, we make five general comments, and they are as follows:

Amendments to the Power Corporation Act should be assessed on the contribution they can make to ensuring that Ontario's public electricity system can continue to provide consumers with a reliable and sufficient supply of electricity at cost. That is very important: reliable, sufficient and cost.

Amendments should support and not hinder Ontario Hydro's ability to construct the necessary additional facilities to meet the growing needs of Ontario in the 1990s and beyond.

Amendments should not place additional economic burdens on electricity consumers when government requests Ontario Hydro to engage in activities unrelated to the reliable supply of electricity.

While the Power Corporation Act should establish the framework for Ontario Hydro and the municipal utilities, it should not permit political interference in the day-to-day operation of these organizations.

Ontario Hydro and the municipal utilities should be governed by laws of general application relating to the environment, occupational health and safety, labour, and industrial development that also apply to other large public and private undertakings. The electricity consumer should not be discriminated against by policies in these areas.

Now I would like to just expand on some of these comments.

When the consumer's electricity meter spins, the consumer is only concerned that the charges being accumulated relate to the supply of electricity. The consumer should not be faced with a large number of buried costs which arise out of a host of activities that are unnecessary to the supply of the product that is being used.

With the new powers to authorize economic development programs, energy conservation and related business ventures, the accounting and rate-making for Ontario Hydro are going to become much more complex. Where costs from these activities do not relate to the supply of electricity, continued scrutiny will be required to ensure these costs are met from sources other than the electricity ratepayers.

This concern is derived from the principle that has been identified with Ontario Hydro and the MEA commissions from the very outset of its being, and that is the concept of power at cost. This principle also forms the basis for our approach to the issues of responsiveness and accountability. While I guess in the past few days you have had much debate on terms and adjectives such as "public," "government" and "legislative," we believe the responsiveness and accountability of an organization should be measured by the people it serves. In the case of Ontario Hydro, these people are the electricity consumers of Ontario.

Many will argue that the electricity consumers and the public are one and the same. Whether you agree or not, the fact is that when the electricity meter spins, it is not measuring the approval of an economic development program or measuring a technical assistance venture in a far-off land or anything else. It is measuring the consumption of a commodity. The consumer expects that he is being charged the cost of that commodity.

We would urge this committee to consider ways of strengthening the responsiveness of Ontario Hydro to electricity consumers. This committee can play a leadership role in that direction by recommending that the expanded board of directors of Ontario Hydro have at least one third of its members drawn from the municipal electric utilities, which now serve 70 per cent of the customers in Ontario and have a 70 per cent equity in Ontario Hydro.

In fact, just to get away for a moment, if Ontario Hydro were a company issuing shares, the public utilities of this province would have on their books enough equity to say, "Give us 70 per cent of the shares of your company." But we are

not asking for 70 per cent of the seats on the Ontario Hydro board.

You can also recommend that the municipal electric utilities be closely involved in decisions of Ontario Hydro and the government that relate to new areas of activity which the amendments will permit.

To summarize, we believe the existing system has served this province well and if you will look at the world's electricity supply, you may well find it likely has served it the best of anywhere in the world.

The Power Corporation Act will need to strengthen the existing system so to better meet with the growth in demand. The principle of power at cost must be upheld. The consumer should expect that when he gets a hydro bill, it is a bill and nothing more; it is bill for supplying electricity and that is it.

Accountability can be improved by having appropriate municipal utility representation on Ontario Hydro's board of directors. The select committee, and through it the Legislature, are part of the co-operative partnership that is a superb electricity system in Ontario today. We in the utilities system are looking to you people to strengthen that bond.

Mrs Sullivan: I am interested, as I was in the last presentation to the select committee, in the recommendations of the Municipal Electric Association. I am quite taken, actually, with your emphasis on the supply of electricity being the single and total purpose, really, of Ontario Hydro.

I find in some ways that your thinking is against the mainstream of the approach in terms of what supply means. On page 5 of your brief, you are adamant about including energy conservation program costs in the cost of supplying electricity. Surely, conservation programs are simply another approach to supply.

Mr Cureatz: I wonder if I might ask a supplementary while you are thinking about that; it is along the same line. We had a presentation yesterday which I felt was the extreme the other way: that everything should be included in your hydro bill. I wanted to get into it but I just did not have the energy to start fighting about what should or should not be included. Along the same lines as Mrs Sullivan's question, what I am looking for is where you think the line is drawn. When you say you just want them to send a bill, what the heck does the bill cover?

Mr Anderson: I am just trying to get some very clear delineations between conservation and other economic means that will defer or put off

for ever the need for additional supply. I think you can quite reasonably argue that if you have a program that is going to mean a lessening of electricity demands such that you will not have to build new plant, then it is reasonable to expect that the cost is okay for Ontario Hydro to be involved in.

If, on the other hand, it is just that you think it is a good thing and really has no effect on the supply and is not going to make any difference, then I have some problems with that.

1030

Mrs Sullivan: Could you give me an example of a conservation program that might fit into that kind of description?

Mr Jennings: One of the ways of looking at it is to do exactly what you suggested and look at any conservation program as a supply option. If you take that approach, then what we are trying to say here is that the decision to go ahead or not should be based on supply decisions—which is the more appropriate cost decision. In supply options you are dealing with, if you like, avoided cost. If a generation option is costing you four cents and the conservation option is costing you 4.5 cents for the same kilowatt, you make that as an economic-supply decision.

Mrs Sullivan: In your approach, would you say that environmental protection should be included as part of the cost?

Mr Anderson: Yes, it must be. If you are going to burn coal, then you had better put scrubbers on. All of us are going to be greens. We must be. If you are going to do anything to harm the environment with the production of electricity, then you are going to be required to do those things to abate that. We do not see any other way you can go about the production of electricity or any other power source in this province, but if you are going to damage the environment, you should not be allowed to do it. That is very simple.

In these kind of terms we have a bit of a problem, though, because I heard an interesting theory at the energy conference: that if we all continue to use fossil fuels, biomass fuels or anything that is going to pollute the atmosphere, at the rate we are going and at the rate electricity use and general power use is expanding in the world, we are going to double within the next 50 years the use of power on this planet.

If that happens and we continue at the rate we are going, in 50 years we may not have a planet worth living on. One of the suggestions was that the developing world has a responsibility to the

whole world to use the high-technology productions of power—such as nuclear energy, which is nonpolluting to the atmosphere—and to leave the low-tech biomass or fossil fuels to the Third World developing nations which cannot afford the higher technology types of things.

If we go that way, the present level of polluting the world will stay about where it is. To me, that is not acceptable. As a starting point, you have to start somewhere. Most of us do not even want to start at that point.

Mrs Sullivan: Just to follow up, since the words of your brief appear to be, or at least I understood them to be, different than what your approach is, can you tell me what kinds of initiatives the Municipal Electric Association and its individual members have been taking in terms of conservation programs in the encouragement of efficiency?

Mr Anderson: Last week, you should have received in your paper a Home Hardware flyer from Ontario Hydro that is encouraging you to go out and purchase a number of things at quite a reduced cost in order to do the things that will conserve energy in your home.

Mrs Sullivan: Were the municipal utilities involved in that promotion?

Mr Anderson: Yes. We were involved in it right from the word “go.” Something happened in the distribution of those to the utilities that did not allow us to get out as much information as we should have. We and Hydro are trying to track down exactly where the glitch got into the system because it was not supposed to happen that way. In terms of the use of more high-efficiency motors, we are working with Ontario Hydro. In all the energy management programs, and these are really conservation programs, we are actively involved. We have a committee that is actively involved with Ontario Hydro. We are going to be sitting on one of the Ontario Hydro committees that is looking at this in the future. We have them sitting on our committee.

Street lighting is another one on which we have gone around and we have actively supported and been out there constantly encouraging our members to use sodium lights, which cut the use of electricity. We have been involved in a load management program of water heaters to cut peaks. We are getting more involved in time-of-use rates, along with Ontario Hydro. In North York, for instance, we have 250 customers now on time-of-use rates to see exactly which time-of-use rate is best for the customers: using which rate do they save the most.

We have given over the years, along with Ontario Hydro, free energy audits. In North York—I speak for my own utility—we have gone out and given awards to places such as Fairview Mall for cutting back on the use of electricity. We are looking at more time-of-use measures, along with Ontario Hydro, in the years to come.

In my estimation, the MEA is the key to energy efficiency and conservation in this province. Without it, Ontario Hydro’s programs will not work. They realize that. I do not think we have any argument. The problem is to come up now with the programs that are viable, that we can contribute to, that we can support, that we can help people with.

Mrs Sullivan: Yesterday there was a group before us, and I cannot remember which presenter it was, that raised the issue of municipal utilities being co-operative in terms of parallel generation. We asked whether there had been evidence they were not and they said there has not been a lot of evidence, but there was a concern that the municipal utilities might drag their heels on enabling parallel or private enterprise generation to proceed. Do you do know what kinds of things they would be worried about? What would your comments be?

Mr Anderson: Yes. I think that is an unfair statement. One of the things we would like to do is be able to get into more parallel generation and cogeneration with some of the utilities in this province. Some individual utilities may be able to see ways in the future to even advance that. We do not think it should all be totally private; maybe the municipal utilities have some role to play in the development of alternative sources. One of the things the previous minister has said to us is, “You will be treated as a municipal utility in exactly the same way now as private developers if you want to develop stuff.”

I think Tony had another comment to make on this.

Mr Jennings: There are two. The ministry policy that came out a couple of months ago was a good example of trying to equalize that and I think that goes part of the direction. The sense of resistance, I think, is probably coming from two things, and I think both of them are not the problems they are purported to be.

One is this feeling that did exist before, that the municipal utilities were being discriminated against because the price they could get, and actually can get at the moment, is lower than the price that a private developer can get. It does not seem to make an awful lot of sense. It is avoided power no matter who generates it.

The second thing is that in some cases the independent producer has to use municipal utility lines to get its power into the Ontario Hydro grid. In effect, they wanted that done for free in some cases, or they objected to the kind of costs the municipal utility was looking at absorbing and had to treat as part of the cost.

I think one of the keys you have to keep in mind in the whole hydro system, particularly for our purposes with the municipal utility system, is that it is a closed system. Every expenditure of money has to be raised by charges to the electrical customer somewhere. There are no tax dollars flowing in and out of it unless you get a Bruce Energy Centre where some government funds go because it is a nonelectric-generation or a nonelectric-supply issue.

1040

If I can take a second, I was concerned about your comment that our comments were different from the comments on page 5. If I may, I would like to go back to that. If you insert one word, I think we are consistent. In the last paragraph on page 5 of our submission, it says, "It would be unfair to include in the cost of bulk power energy conservation programs which will increase the present or future unit costs of supplying electricity." In effect, increasing the rates is the issue we are looking at. At that point in time, from that position, you have the decisions we were talking about before. I mean, I trust that we are not being inconsistent.

Mr Charlton: As a supplementary on that point, I would assume, though, that it is regulated by your comments earlier that if you are going to view conservation as a supply option, even if it is going to increase rates, it is going to increase rates less than a comparable generating option.

Mr Jennings: Yes.

Mr Charlton: You are not saying we should not include those.

Mr Anderson: Or at the same level that bringing on new supply would cost. That is fair game.

I want to go back in terms of co-operation of municipal utilities and private generators. I had the good fortune to be in Markham recently, where Transalta Utilities and Consumers' Gas had developed a system for using waste energy in stepping up their gas line power pressure. I am not technical, so I do not understand what happens, but anyway, when you change the pressure, you have waste energy.

They put in a turbine, and Markham Hydro just about instantly built a line from that little operation into its own system and absorbed it into the Markham Hydro system. It is metered, and Ontario Hydro pays for it, but then it charges back Markham Hydro at the general rate. There has been absolutely no problem, and I can likely find other situations around the province where this is occurring and there is just not a problem.

In fact, we are quite happy to work and quite happy to see it, because we know we just cannot continue to build huge plants without going through all the other steps that are going to be necessary in terms of conservation. We look at conservation in many ways. You must do that, because it is wasteful, and it is wasteful for the world.

Mr Jennings: It is a total cost issue, and you have other utilities where, because of the situation of the operation or the nature of the local distribution system, to bring the local generator on stream is difficult. In fact, in northwestern Ontario, where we were over the weekend, because we do not have sufficient transmission capacity from the northwest to eastern Canada, there are some cogeneration options that are there but are really locked in and not available until we get more transmission lines in.

Mr Anderson: We talk about buying power from Manitoba, which would save the building of new plants here. It is great to buy it, but how do you get it here, where it is really required? There are no transmission lines. The great problem that Ontario Hydro has and that we are beginning to have with transmission lines, is that nobody wants them. They want the electricity, but they do not want the lines.

There is going to be a massive line development and cost involved in transporting electricity, if you get that line from Manitoba. We do buy power and I foresee possibly in the very near future there might be something coming on that and that we will build a line. If we buy 1,000 megawatts from Manitoba, we may well have the ability to develop 1,000-megawatt stations throughout northern Ontario, but there is no way to transport it now.

Mrs Sullivan: Thank you.

Mr Charlton: I have a couple of brief questions. The first one is, you have emphasized throughout your presentation the power-at-cost concept and I do not think anybody has a serious problem with that in the context of how you have expressed it in your comments. It is not set out in the presentation, but you have basically talked about least cost in your comments. Is it your view

that Ontario Hydro's current approach to rates reflects costs?

Mr Anderson: I think I had better ask our rate expert, Charlie Macaluso, because he gets involved in all the Ontario Energy Board hearings on this.

Mr Macaluso: First of all, when you are dealing with costs on Hydro, or rates for that matter, it is not a specific science, but I think the attempt is made to track it as best you can. Given the parameters that are acceptable, yes, I would say Ontario Hydro is reflecting costs.

Mr Anderson: As you will notice from the Ontario Energy Board hearings this year, the Ontario Energy Board came out with a recommendation of three point something for a rate increase. We may have been one of the higher ones at 5.5 per cent, if I recall correctly.

Mr Macaluso: It was 5.3 per cent plus 2.2 per cent.

Mr Anderson: Plus 2.2 per cent of additional government tax.

Mr Charlton: Remembering, though, that the energy board's recommendations both this year and in other years have said, and said clearly, that in its view Hydro rates do not currently reflect costs. Their recommendation this year that the rate increase should be lower was a recognition of the reality of what Hydro charges and does not charge for.

Mr Anderson: We have some differences of opinion. We feel that because they have a short-term look at this, they actually made some mistakes this year and in the past.

Mr Charlton: There is no question they have made mistakes before; last year too.

My second and last question: It bothers me somewhat, although my concerns were partly allayed by the comments you made which, again, are not in the presentation, and I refer specifically to the story related to us from the World Energy Conference, the prediction that if we continue down the road we are presently on in terms of increasing energy consumption, in 50 years we will have doubled energy use in this world and will probably have destroyed the planet.

On the other hand, it seems to me that the focus of your presentation is saying that is exactly the road we should go down, that we have to be prepared to meet that demand, whatever it is. That bothers me somewhat. Does not the kind of discussion that was going on at the World Energy Conference say to all of us that if demand increases too quickly, it is going to put us into the kind of scenario that was discussed at the World

Energy Conference, and that we have to find every available means to ensure that does not happen? Should that not be the focus of all the things we are discussing here now?

Mr Anderson: Yes. There's a Hobson's choice and a catch-22 in this whole thing where the Third World countries say: "You in the developing countries have burned your forests. You've destroyed your forests. You've made use of all of the wealth of the world to get where you are. Now it's our turn and we shouldn't be dissuaded from growing to where the rest of you are." But at the same time, if you drag us down, you are going to keep them down. I just do not know what the answer to that is and certainly nobody there knows. There are opinions, but you have unbelievable problems. For us to go backwards—I do not believe that you can go backwards anywhere in the world; You cannot even stay the same.

Mr Charlton: I think I agree with you that none of us has all the answers and none of us will instantly find all the answers just by changing the point at which we start. But do we not first have to say, "Instead of saying that demand is growing faster than predictions and we have to be prepared to meet that demand, isn't it time we have to take the different perspective from which we start, that demand is growing faster than predictions and that we have to find every possible way to change that because we cannot afford to allow that to come true for the next 50 years"?

Mr Anderson: I do not disagree with what you are saying and I do not know how—

Mr Charlton: That is what I am getting at. We have to change the focus of our thinking so that we will find some of the answers. If the focus of our thinking stays on meeting the demand as it grows, we may never change the direction for the future.

1050

Mr Anderson: I think we have to do both and we have to do a lot more of the one. We still will have to meet demand, but we have to also do everything possible to cut consumption and to cut demand without sacrificing what we have in this province.

Mr Jennings: It seems to me that we trying to deal with two or three levels of issues at the same time. One is the north-south, Third-World/developed-countries issue. That is going to be a very difficult one to sort out. Frankly, I believe it is beyond the operational purview of our

organization, but it is one we have to keep in mind.

The second thing that came out of the World Energy Conference that really struck me heavily was the acceptance by most of the people there from all around the world that nuclear is a safe, legitimate and valued option. I would have expected there to have been much more debate around that.

The third thing was a consistent word, that conservation had to be the immediate option. Although it was not going to be the long-term solution, it had to be the immediate priority.

I think that in the context of today's discussion, we are dealing with two issues again. One is the need for society, and you people in Ontario represent that society, to deal with conservation. As long as the electric system is treated the same as other businesses, I think we will do our part. That equality of treatment is what we are looking for. Then I think we are saying whatever the citizens of this province will accept, our members will try and implement. They will go further than that, in that they want to be part of the solution by persuading people to accept more.

We believe that the system itself, and the Power Corporation Act we are here to talk about, should be defined to reflect the business operation, to provide the framework for that business to operate.

Mr Charlton: I do not disagree with you in that respect. I guess the question before us, though, is ultimately the government policy that the corporation then operates, and that you people jointly operate with Hydro, as a result of the Power Corporation Act. The questions you have raised in your presentation, I think, have to be somewhat better focused. Again, you have mentioned the different levels of debate, but most certainly, no matter which level of debate we are looking at, the more we do right here to reduce our energy consumption, the less the other levels of debate are issues because it will relieve pressure on those areas of debate.

Mr Anderson: As I have pointed out in my oral brief, there are two things that are happening in this province to make everything a little more difficult. One is the continued growth of the population in this province and the money that is coming in from outside, particularly from the oriental nations of our world that are pouring money into Ontario and the west. The economic strength of this province continues to grow whether we like it or not.

I would hope that it does continue to grow into the future, because if it does not, we may end up

looking at ourselves as part of the United States, heaven forbid, because we are another Georgia or something and we just do not have any enterprise. I want to see the economic growth continue, which means the population growth continues, but at the same time, in some way, we have to do something to become much more efficient in our use of energy in this province. We may well have to force some people in the future to go to efficient street lighting. It may not be good enough to say that it is on a voluntary basis. We may have to say, "Whether you like it or not, somebody has to do it."

Mr Charlton: Those kinds of comments are very helpful. Like I said, you do not get the same impression from the printed brief as we are getting from your comments and that is all useful because that is what I was trying to get you to say.

Mr McGuigan: I am sorry I had to go out and missed Mrs Sullivan's comments, so I might be covering the same ground she covered.

I do not question your right and your sincerity to question this business of whether the spinning meter should be the sole judge of how we proceed with Hydro but I do have a little bit of a problem that I would like to express.

Whether Ontario Hydro has wanted to or not, it has shaped the economic development of this province from the day the first large station went in at Niagara Falls. I recognize, too, that governments have less power than they think they have when it comes to shaping how things develop. Economics really rules and governments follow more than they would like to admit. There is not as much leadership there. Just look at Toronto. I think a lot of us would say that Toronto should slow down and growth should take place in other places, but nevertheless it is coming this way.

Recognizing all of those powers, I still think we have to recognize that if it is not a profit-making organization, and you support that, then it does have some social and economic role to play in Ontario. Part of that role is, say, encouraging parallel generation, as an example. That is part of the role. Other parts could be encouraging development in northern or eastern Ontario. If those things do impact on rates, and I would suggest they impact with very small effect, taking the immensity of Hydro; one or two or half a dozen small plants would have a very minimal effect on the overall rates—then it seems to me we should accept that role.

If I can just give you an example, the present budget today for highways is \$2 billion a year, a big jump over the previous budget. That is going

to have a big impact upon the development and directions we have in Ontario. It is about the same budget in capital as Ontario Hydro's, I understand. Whether we like it or not, there is role that Hydro is going to play in that direction. I just feel we have to accept that it is not the spinning meter, 100 per cent, that determines the way we go.

Mr Anderson: I am afraid I must take issue with you. You can go out and buy all kinds of non-nuclear and private power at 16 cents a kilowatt-hour if you want to do that. You may buy a couple of small ones, but as sure as blazes, I know that if you do offer that kind of money, there will be all kinds of power coming on stream in this province from all kinds of different areas.

I cannot quite buy your argument that because you are a nonprofit organization, you can spend money willy-nilly without anything else because it will only increase the rate but we still will not make any profit. I do not quite buy that argument. I think we also have a different role for roads, which is a government thing that can raise taxes. Government has a role, by my way of thinking, to provide good social services in this province through the general taxation of everyone.

If there are social development roles, then I think you will find a way to supplement Ontario Hydro's initiatives through government taxation. If that is your wish, we have absolutely no problem with that. We see that as the way to go.

Mr McGuigan: I think your argument has a weak spot in it in that we do not tax Hydro.

Mr Anderson: I do not know whether you want to get into the role of not taxing Hydro because I believe we just had a two and a half per cent tax administered in the last budget through guaranteeing a debt that does not need guaranteeing. Maybe if they went on their own, they would do better than with your supposed guarantee, and I do not want to get into that kind of argument. That is a tax.

You have water rate charges now where water is free and free-flowing, and I understand Ontario Hydro pays umpteen millions of dollars a year to the government of Ontario to rent that water to run it for the little bit of time it runs through the generating plant.

I would say that you have stepped into the taxing game. I would say the federal government now, with its general sales tax of nine per cent which will be applied to electricity, is also going to get into the taxing game. I see coming in the future that the provincial governments will make the federal government take all the blame for all

the taxes by uniting their sales tax with the federal government. I make that as a personal prediction. You will end up with a direct tax on electricity again. Maybe you can use some of that money for social programs.

Mr McGuigan: I guess we will have to agree to disagree. However, I do not think of water charges as being a tax. When I am talking about taxes, I am talking of an income tax. We do not have an income tax on Hydro.

Mr Anderson: You do not have it on the Toronto Transit Commission or other nonprofit organizations or GO trains either.

Mr McGuigan: And they have a social role to play.

Mr Anderson: They have a social role to play and the government has a role to make sure they operate. I think governments will have a greater role and a greater and different tax role in the future in developing some scheme that will alleviate our social problems. The automobile, to me, is a great social problem in this province, particularly in this city. By just charging greater taxes on gasoline or tires or whatever else, I do not think you are going to alleviate that social problem created by automobiles. I think you are going to have to talk about new ways; maybe electric railroads running a lot more.

Mr McGuigan: How did that happen to come in?

Mr Jennings: If I can respond to you using your example of the TTC or GO Transit: You are absolutely right, there is a social role to play, and where that social role is played, the tax money is making up the difference. Their rates are not bearing the social cost; tax dollars are. The consumers are paying a portion which relates to the benefit they get from it but tax dollars are making up the difference. That is all we are talking about in the electricity system.

Mr McGuigan: I do not think your analogy quite covers it all, though, because there are a lot of tax dollars taken in off the automobile system which are not taken in with Hydro.

Mr Jennings: True, and out of the profit portion or individual person's portion, your individual electric consumer pays—

Mr McGuigan: We had better quit.

The Chairman: Just that subject, I hope.

Mr Cureatz: Just to get back to the legislation at hand—

Mr Charlton: Party pooper.

Mr Cureatz: —which is so unlike me, I know; a new trend to be set for the last two years of this government.

Generally speaking, the cabinet is going to have the authority to intervene more directly in areas of concern in the operations of Ontario Hydro. I am wondering, generally speaking, whether you feel comfortable with that. I do not think I saw anything in particular that says you are or you are not.

I was confused that you have 70 per cent of the capital of Hydro. I want just a bit of clarification on that. That has flowed from the effect that the municipal people are going to have with instructions by the Ontario cabinet to Ontario Hydro which, in turn, sends the direction down to you people. Should there maybe be greater dialogue between the policymaking people and you people?

Mr Anderson: In the past, the government, the cabinet and the Premier have had tremendous influence on Ontario Hydro. Not having been there with their decision-making, I would say that basically we look upon Ontario Hydro as an independent, autonomous organization taking one heck of a lot of guidance. It is like a parent, in my way of thinking, the cabinet and the Premier being that parent and giving a lot of advice, in many cases very good advice. The wise child will take that advice or he is going to be in trouble. That is the way we see it continuing to operate, with the good parent giving good advice and the good child taking that advice or else look out.

Mr Cureatz: Are you the grandchild then?

Mr Anderson: We are the grandchildren, and sometimes grandchildren become obstreperous, as you well know. They are great with the grandparent but sometimes a little problem with the parent. That is the way I kind of look at it. We do have trouble with our parents once in a while too and we have a lot of trouble sometimes with the grandparents.

Mr Cureatz: So you do not object to the focus of the legislation in terms of the effect?

Mr Anderson: No.

Mr Jennings: If I can draw your attention to the top of page 8 in the submission, basically we are assuming that the bill will provide a framework that is consistent. If there is direction given by the government, we feel that it should be public so that everybody knows what that direction is. We are then in a position, like other players, to act on whatever the direction is. One of the arguments that may come out is whether or not the funding should be tax dollars or other dollars, but it is not inappropriate for the government to use this vehicle. All we are

concerned about is the effect on the consumers of the electricity.

Mr Cureatz: With regard to the 70 per cent figure that you use, if you add up all the assets of the municipal electrical associations, as I understood it, in theory they would have 70 per cent ownership of Hydro.

Mr Anderson: That is right.

Mr Cureatz: All your capital expenditures—

Mr Charlton: We are talking about Hydro's assets.

Mr Anderson: There are two sets of assets. One set is owned locally in the community. The other part of the asset base that every utility in this province has, and it is right on its account sheet, is so much equity in Ontario Hydro. If you subtracted the 20 per cent that is not debt of Hydro, of that 20 per cent the municipalities own 70 per cent and the other 30 per cent belongs, to my way of thinking, to the large power users and the other people of Ontario who have contributed to that base. But 70 per cent is carried on the books of the individual utilities in this province and we own 70 per cent. As I say, if we were shareholders, we would be given enough shares to vote everybody out of office.

Mr Jennings: I am probably going to oversimplify, and Mr Macaluso may want to expand, but basically all the funding for establishing Ontario Hydro and the commission initially, etc, came from the municipalities.

Mrs Sullivan: That was a long time ago. Things have changed.

Mr Charlton: They do not forget, though.

Mr Jennings: The Hudson's Bay Co was even longer ago.

The Chairman: Are there further questions from the committee? Seeing none, Mr Anderson, I would like to thank you and your delegation for coming forward and sharing your views with us and taking the time out of your otherwise busy schedules.

Mr Anderson: We thank you for the opportunity to come before you to make our presentation and clarify matters that do not always get clarified on pieces of paper. Sometimes we get accused of positions that we do not really have.

The Chairman: I am glad you have had a chance to clarify those today.

That is our last witness this morning, so I will adjourn now until 2 pm.

The committee recessed at 1104.

AFTERNOON SITTING

The committee resumed at 1403 in room 228.

The Vice-Chairman: Good afternoon, ladies and gentlemen. We will call the select committee on energy to order. We have the Association of Major Power Consumers in Ontario. Perhaps you would just introduce yourselves for our own information and also to get it on the record of Hansard and proceed with your submission.

ASSOCIATION OF MAJOR POWER
CONSUMERS IN ONTARIO

Mr Davies: Thank you, Mr Chairman and members of the committee. My name is Jeffrey Davies, and I am counsel to the Association of Major Power Consumers in Ontario, AMPCO. To my immediate left is T. B. Lounsbury, who is the executive director of AMPCO. To my right is Don Nevison, who is an engineering consultant with Utility Professionals International and adviser to AMPCO. To Mr Nevison's right is Ian Watson of Union Carbide. Mr Watson is the vice-chairman of AMPCO and the incoming chairman of AMPCO.

We propose to start by introducing AMPCO, and I think it is important for you to recognize that AMPCO is made up of 65 member companies which together consume approximately 21 per cent of all electrical power produced in Ontario. Together they provide direct and indirect employment for over 400,000 people in 200 facilities throughout the province.

AMPCO has a significant interest in all matters relating to the production and supply of electricity, including the regulation of Ontario Hydro by this Legislature. Bill 204 has been reviewed carefully and, while AMPCO is in general agreement with the proposed amendments, we are here today to offer some comments and some suggestions.

I would like also to say by way of introduction that the submissions that will be made today by AMPCO are within the parameters of the proposed bill and do not purport to go beyond that. As the bill is short and simple, our submissions will be of the same ilk.

First of all, I would like to deal with section 8 of the bill which refers to the policy statements that can be made by the Minister of Energy and say that AMPCO applauds this provision empowering the Minister of Energy to issue policy statements relating to the exercise of Hydro's powers and duties, together with the requirement

that Hydro use its best efforts to ensure compliance with any such policies.

This mechanism, if used effectively, will enable the minister to provide guidance and direction on a number of important issues. Such policy guidance will provide assistance not only to Hydro but to its customers, suppliers, regulatory bodies and the general public. AMPCO would welcome policy statements in regard to a number of different aspects of Hydro's operations.

In view of the potential significance of any such policy statements, AMPCO suggests that they be prereleased in draft form to all interested parties. This would enable public discussion and input prior to the release or the approval of the policy. A similar procedure is followed in the case of policy statements made pursuant to section 3 of the Planning Act, as I am sure many or all of you know, and AMPCO suggests that a similar mechanism be built into the Power Corporation Act for the prior release of draft policy statements in order to provide a mechanism for public discussion and debate.

AMPCO wishes to be part of the policy formulation process and, in view of its expertise and resources in this area, believes that it could and would make a valuable contribution. This would be enabled if the legislation were to require the release in draft form of the proposed policy. It would also give the public in all of its elements some time to get used to the notion of that particular policy before it is introduced, and AMPCO believes that that would be a good thing.

Section 13 of the bill deals with economic development and we have some points that we would like to make about that portion of the bill. AMPCO does have some concern about section 13 to the extent that it can be interpreted as sanctioning subsidization of economic development programs by the ratepayers of Ontario Hydro.

One of the central philosophies in the Power Corporation Act, one that certainly is not under review in the context of this bill and one that AMPCO supports, is that Hydro should provide power to its Ontario customers at cost. This philosophy, in AMPCO's view, leaves no room for subsidization. On the other hand, AMPCO agrees that worthwhile economic development projects should be pursued. However, such programs should be funded out of the

provincial Treasury and not by Hydro's customers. AMPCO therefore submits that section 13 should be qualified to make it clear that the costs of economic development programs in which Hydro may be engaged will be paid by the provincial Treasury.

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Third, sections 24 through 26 of the bill deal with energy management and Hydro's ability to implement various energy management strategies. To the extent that these sections will make it possible for Hydro to pursue more effectively the important objective of energy management, they have AMPCO's full support.

However, it must be stressed, and stressed strongly, that while energy management is a worthwhile and necessary goal, it should not be seen as a cure-all or panacea. Neither Hydro, the government nor the citizens of Ontario should be lulled into a false sense of security by these energy management initiatives, for it is quite clear that they, by themselves, will not avert an electricity supply crisis in the 1990s.

Attached to the submission that will be handed out in a moment is a table entitled Ontario Hydro Supply and Demand in Gigawatts to the Year 2000. Based on data currently available, this table demonstrates that even with an optimistic allowance for the success of the energy management program, shortfalls in electricity will be experienced by 1997 at the latest and perhaps as early as the mid-1990s. If shortfalls are to be avoided, supply strategies must be aggressively pursued immediately.

Any discussion on energy management gives rise to the issue of energy efficiency, a topic which has received a great deal of attention in the press recently. The contention that Canada is dramatically less efficient than its competitors is addressed in a further attachment to the submission.

At this time, I would like to turn our presentation over to Mr Nevison. If I could ask Ms Deller to pass out the submissions, Mr Nevison will refer to the attachments and the looming supply crisis, together with the points we want to make on energy efficiency.

Mr Nevison: As Mr Davies has just said, we have a few comments to make on the potential savings obtainable from energy management and their effect on electricity demand/supply balance. The table attached to our brief has been prepared for this purpose.

I refer now to the table. AMPCO prepared an analysis of the electricity supply situation about a year ago and concluded that the level of

generating reserve would fall below the standard required for good reliability in 1994-95 and would continue to fall steeply unless a large block of new supply were brought on to the system before the year 2000. That analysis was based on energy management savings of 4,500 megawatts by 2000 and an underlying peak-load growth of 4.5 per cent per year, which is less than 80 per cent of the actual rate experienced in 1984 to 1988.

The table we have in front of us has been prepared to show the effect of achieving 7,600 megawatts of energy management savings, that is, 3,100 more than last year's study assumed. This amount, together with allowances for cogeneration and load shifting, has appeared in the press recently, and the suggestion is that this will take care of us to the year 2000.

The Vice-Chairman: Just for clarification, the table you are referring to is the long pull-out one, is it?

Mr Nevison: Yes, that is correct.

Mr Cureatz: I am interested in this area which you are discussing. Were you referring to any area particularly, so that I can make reference to the table, where you said "anticipated savings of 3,500 megawatts"?

Mr Nevison: All right, we will go to the table and talk about the numbers on the table.

The Vice-Chairman: I do not see that figure on the paper here.

Mr Nevison: It takes a little bit of arithmetic to arrive at that.

There are two general headings on the table. One is peak demand and demand management, and the other is supply. If we look under the first one, the first column after the year is the 20-minute peak demand that AMPCO expects if the load grows at 4.5 per cent per year, as it has been doing. In fact, it has been doing more than that for the last four years or so.

Then we start adjusting that underlying demand for the effect of the load shift, which is part of the energy management program, and that is expected to be 1,000 megawatts by the year 2000, mainly due to the implementation of time-of-use rates. Then there is an interruptible block of load on the system at 0.6 gigawatts, or 600 megawatts. That is where it stands now. There is some concern that a good deal of that will be lost because the frequency of interruptions is no longer making it effective to carry that kind of load with the discount that is now in effect.

Then we come to the next two columns. These are the mainstays of the energy management program. I am using Ontario Hydro's latest terminology. They break up their energy management program into two parts: savings from information-driven programs and savings from incentive-driven programs. If I add up columns 3, 5 and 6, I think that will come to 7.6 gigawatts or 7,600 megawatts. In the earlier study we did, that total was 4,500–3,100 less.

If we move on across the table, column 7 is the result of reducing the forecast 20-minute peak by the amounts in columns 3, 4, 5 and 6. That gives us the amount of demand that we would expect over the next 10 years. That is peak demand; that is not average or energy.

Then we come to the supply side. Column 8 is what it says it is; it includes not only what Hydro has operating on its system now but also about 1,500 megawatts of mothballed capacity. It also includes, in the later years, some additions to their hydraulic capacity at Niagara and Mattagami River and Little Jackfish.

The next column is something that you normally will not find in a display like this, but these are so significant that we feel we have to include them. These are the outages for retubing. Most of the time, if you do a maintenance outage, you can do it in the summertime so that you do not affect the capacity available during the peak periods, but these outages last for more than a year, getting on to two years, so we have included those.

1420

Then we have a mysterious-looking entry called NUG, which means nonutility generation. That has been taken by the year 2000 to be 1,500 for this analysis, although Hydro is targeted at 1,000. They are looking to adjust that. Whether they are going to go to 2,000 or not, as I believe the ministry is suggesting, I am not sure.

There is a small purchase from Manitoba that has been committed. It comes in in 1998. That is the next column. The sum of all the supply columns appears in column 12. Column 13 is the required supply. That is obtained by taking the net demand after all the savings from energy management programs and adding 25 per cent to it for reserve capacity.

The final column shows whether the total supply equals the required supply or is in deficit. It can be seen here that it gets into a deficit position in 1997, but it is pretty thin even two years before that. It would not take much to go wrong to have the reserve capacity start to erode even earlier than we show. That was the result of

the study last year when we had more modest amounts in here for incentive-driven demand management.

Mr Cureatz: May I ask a question?

The Vice-Chairman: I wonder, should we finish this, or because of the technicality of it perhaps should I allow—

Mr Cureatz: That is what I was thinking. I will forget.

The Vice-Chairman: Okay.

Mr Cureatz: Just to refresh my memory—I know it is simple for you people—you add columns 3, 5 and 6 and you get 400 megawatts?

Mr Nevison: No. If you take the year 2000, that is the target year for all these numbers we see in the press. If we add 1 and 1.5 we get 2.5, plus 5.1 equals 7.6, or in megawatts, 7,600.

Mr Charlton: That is 7,600 megawatts.

Mr Cureatz: That is where I made the mistake. What would you anticipate to be done if nothing happens in terms of policymaking decisions, if all works out according to the figures, come 1996, when we reach the deficit stage?

Mr Nevison: The fact of the matter is that if we are looking for a big generating station, we could not have it in service by 1997, but you could probably put a couple of thousand megawatts of gas turbines in as an emergency measure. It is not the best use of natural gas unless you can combine it as cogeneration, but there is already quite a lot in here for cogeneration; that is, the 1,500 megawatts of what they call nonutility generation. That really is the only short-term solution to the thing that I can see. There is some prospect, perhaps, of buying something from Quebec, but that would not be available until maybe 1998-99.

Mr Cureatz: So you think short-term gas could bring on 2,000 megawatts or a decision should be made now about the major generating station.

Mr Charlton: Even if it is made now it is not going to bring the major generator on in this time frame.

Mr Nevison: This table only goes to the year 2000. If nothing gets done soon it is going to be that much worse after that.

Mr Cureatz: That is sort of the path I am trying to lead you down, because I have been asking the odd question in the Legislature of the Minister of Energy, and I know our parliamentary assistant and the incoming chairman of the select committee on energy will take that back to

the Minister of Energy and those powers that be in cabinet, to tell them we had better hurry up and get on with the decision on a station. Otherwise I am sure the official opposition will be screaming that producing electricity by gas is totally inefficient, even if you are not happy about nuclear power.

Mr Charlton: Who was it who made all the proposals in here last fall on gas?

Mr Cureatz: Thank you, Mr Chairman.

The Vice-Chairman: If I can be helpful, is the key to this column 13 that in your 25 per cent reserve capacity, unless you bring another plant on stream, your contention is we do not have that reserve capacity?

Mr Nevison: We do not have enough to maintain the standard of reliability and service that we normally expect. That does not mean the whole system would be shut down. There can be rotating load cuts. This set of numbers has all sorts of uncertainties in it. The biggest one, of course, is how successful the incentive-driven energy management programs are going to be.

The other element on that count is that it is very hard to judge how quickly these programs will produce the savings they hope for. I believe it will be a slow start and will accelerate, but it is hard to know. If it goes that way then you have a very thin margin over the required reserve, even back in 1995 or 1994 if it materializes very quickly. It would not be the same situation.

The Vice-Chairman: Just in regard to our procedure, do you have more in your brief or shall we—

Mr Davies: Yes, we do.

Mr Charlton: I would like to address the table.

Mr Davies: Just before you do, I am going to ask Mr Nevison to speak a little more about the importance of the reserve and some of the recent outages, so the committee will appreciate that it is not a number pulled out of thin air.

Mr Nevison: We can try. Hydro did a reserves study several years ago which basically examined what they call the customer damage function from lack of supply versus the cost of investing to make sure there was ample supply. As you might expect, of course, there is an optimum range there where you get the best answer. It produces what is generally called the bathtub curve. If your reserve drops below about 18 or 20 per cent, the damage function rises very steeply—in other words, customers are severely hurt financially—whereas if you go out on the other end of the curve where you are adding additional invest-

ment and capacity, it does not rise so steeply until you are out around 30 per cent reserve.

So the right number is thought to be in the neighbourhood of 25 per cent. I think Hydro actually uses 24 per cent right now. They have not accepted the uncertainties that go with the very optimistic estimate of incentive-driven energy management. They are assuming that 4,500 in total is a more likely target. This set of numbers is assuming 3,100 megawatts in addition to that, and that introduces an uncertainty, so we felt justified in adding one percentage point to the reserve level. That is how we came to the 25 per cent.

The Vice-Chairman: Mr Charlton had a question on the table.

Mr Charlton: I just want the committee to be totally clear on what the table says so that in any dealings we have with the table we fully understand what it is we are talking about. I would like to go back to columns 1 and 2 in the table. What you have set out here is a table that is based on a four and a half per cent increase in electrical energy use every year for the next 12.

1430

We had the Municipal Electric Association before us this morning, and all of those gentlemen fortunately attended the World Energy Conference last week, which, as you are aware, was attended by energy experts and scientists from around the world. If what you are predicting in this table here at 4.5 per cent per year for the next 12 years is a reality, we will be significantly well on our way to the point where it will not matter anyway whether we get there or not, because at that kind of energy growth rate in Canada and around the rest of the world, there will not be much left to try to protect in terms of industry or jobs or anything else.

I think that is a reality that we have to deal with in this committee, whether or not the low predictions that some have made and the high predictions that others have made in terms of a continuous growth rate are realistic when we look at the way growth has gone up and down over the course of the last 12 or 15 years and the way the economy has rolled, which has reflected that growth change. Why have you chosen—

The Vice-Chairman: Mr Charlton, I have to interrupt.

Mr Charlton: Why have you chosen in your table to—

The Vice-Chairman: Kindly limit it to questions, and then we will certainly give you time for your—

Mr Charlton: I am trying to ask a question, Mr Chairman.

I think we understand your concerns about being in a position 10 years down the road of being short of energy, as the major power consumers in this province, but why have you chosen an approach which, in my view, just represents the other extreme of those who are saying that Hydro is wrong? We have some saying Hydro is wrong because it is high, and we have others saying Hydro is wrong because it is low. The extremes end up, in my view, somewhat losing their credibility, because they become the extreme. Why have you chosen to take it out that far?

Mr Nevison: The first reason is that the growth from 1984 to 1988 has been 5.7 per cent per year. This is peak electricity demand. You were talking energy in total there a minute ago, I think.

Mr Charlton: Yes, understanding, though, that that was on top of some negative growth for four years.

Mr Nevison: Actually, if you go back to 1970 and plot the growth from 1970 to about 1979, the rate is 6.6 per cent. Then it falls off from 1979 through 1982 to 1.6 per cent, or a number like that. But then there is a rebound effect and it has been growing at 4.6 per cent since about 1982.

The number we are using here is 80 per cent of what it has been doing from 1984 to 1988. That does not seem to me to be wildly extreme. Hydro's high-growth scenario, if I can remember the number now, is about 3.7 per cent. So we are a little higher than that, but not wildly higher. The growth to date until the end of June, I believe it is—maybe Mr Lounsbury can help me here—is 4.9 per cent for Hydro in this year. So 4.5 per cent might be a little high, but not wildly so, in our view.

Mr Charlton: Hydro's predictions, as I understand them, still reflect an average growth rate of 2.7 per cent over the period we are discussing.

Mr Nevison: I think that is the median growth rate.

Mr Charlton: That is right.

Mr Davies: We would want to distance ourselves from those forecasts.

Mr Charlton: I understand that that is precisely what you are doing, but in the context of the period over which we are talking, the difference between 2.7 per cent and 4.5 per cent is not distancing yourself; it is substantially distancing yourself. To go back to the way I put it

in the beginning, the extreme that is reflected here is in fact more severe than the critics on the other side of the fence in this case, the critics who are saying that Hydro is in fact high at 2.7.

Mr Lounsbury: To answer your question directly, the year to date at the end of June is 4.9 per cent.

Mr Charlton: I am not disputing what this year is or what last year was or what next year might be. What I was disputing is why you chose to take that same kind of figure right through 12 consecutive years in this table, when I think we all understand that the realistic possibility of it being 4.5 per cent median over that 12-year period is very unrealistic.

Mr Davies: I guess the point where we part company is that we do not think it is extreme or unrealistic. If you look at the growth lines over the past many years and the momentum behind the very significant Ontario economy and the growth that is simply built into that economy, we do not consider those kinds of growth rates to be extreme or excessive, but represent a prudent planning threshold.

Mr Charlton: Let me put the question to you—this is one last question, Mr Chairman.

If that is the way you approach the question, if the growth rate in 1990 is 3.2 per cent, will AMPCO come back in with an average projection to the year 2000 at 3.2 per cent each year?

Mr Nevison: No. We are not just picking one year, Mr Charlton. We are saying it has been 5.7 per cent on average for the last four years. In fact, it has been more.

Mr Lounsbury: More, far more.

Mr Nevison: If you go back to 1982, it has been 6.6 per cent.

Mr Charlton: And if we go back to 1979, what is it?

Mr Davies: It is not much lower. The only year of negative growth was in 1982 and in the years between 1979 and 1982—

Mr Charlton: It was about 1.6 per cent.

Mr Davies: But there was positive growth in those years.

Mr Charlton: Yes, but it was about 1.6 per cent.

Mr Davies: Yes, but then if you go back, it is all a matter of capturing your time period, if you go back beyond that.

Mr Nevison: Let's look at it this way: From 1972 approximately to 1979 it was 6.6 per cent. Then it fell off, admittedly: 1.6 per cent for three or four years. Then it picked up—

Mr Charlton: The decade before that it was about seven per cent, so it has been a steady decline.

Mr Nevison: Not a steady decline. There was a fairly high growth rate for quite a period before the 1982 recession. Then it went flat briefly at 1.6 per cent. Then it has picked up, not to 6.6 per cent, but still a substantial figure.

Mr Charlton: But the figures you just quoted from the 1970s were a decline from the 1960s.

Mr Davies: Maybe I can end this on a graceful note by saying that—

Mr Cureatz: I doubt it.

Mr Davies: We will try as much as possible. I would not hope to get in the last word, but I will try to end this part of the discussion. If it is of significant interest to the committee, AMPCO has engaged its own load forecasters who have done really quite a terrific job at looking at these numbers and forecasting them out into the future. It is perhaps unfair to put Mr Nevison on the spot to ask him to go into more—

Mr Charlton: That is fair. We understand that the committee did the same thing three years ago.

Mr Davies: If it was critical to the committee we would be happy to come back with our load forecaster and explain why these numbers are imminently reasonable and that it is unreasonable to say they are extreme.

Mr Charlton: I guess the question I wanted to get out of you in terms of the committee was what evidence you have that your load forecaster is any better than the others who have already made presentations to the committee, which in some cases have statistics as extreme the other way, and you have not given us that.

Mr Davies: What I am saying is that if it is the will of the committee to want that information we will be happy to come back and provide it to the committee.

Mr Cureatz: Mr Chairman, I anticipate the committee sitting again under the new and wonderful leadership of our new chairperson; that will be the time, I think, we would like you to come back and share with us.

The Chairman: On that note, Mrs Sullivan, did you have a question on this point? We should probably let them finish their presentation.

Mrs Sullivan: Yes, I do. I missed your figure on what the year to date increase has been. I just want to be clear.

Mr Lounsbury: It is 4.9 per cent to the end of June.

Mrs Sullivan: It has been 4.9 to the end of June? I wanted, if I could, to leap back into questions that relate more to the Power Corporation Act and less to the DSPS, which is probably what we have been doing.

The Chairman: Have you finished your presentation yet?

Mr Nevison: No.

Mrs Sullivan: Okay. Let's do that, then.

The Chairman: I will put you at the top of the list. How about that?

Mr Cureatz: Put me down again.

Mr Nevison: The final point we would like to make on this question of balancing supply and demand is that we would like to stress that savings from energy management will postpone but not eliminate the need for new supply, so we urge that the approval processes begin immediately. There can be no risk involved in at least starting the preparation.

1440

I was going to say something about the second attachment here on our view of Canadian energy efficiency, as opposed to some of the reports that are flying around these days. I will try to be brief. The paper is not very long and anybody who is interested can read it. Having aired our views on energy management measures to maintain a sound balance between electricity supply and demand, we would also like to offer our comments on Canada's position in the energy efficiency standings. To this end, we have appended an analysis prepared last year when headlines were proclaiming that Canada was 30 per cent less efficient than its trading partners in the use of energy.

The point we would like to leave with you today is that it is a fact that Canadians use energy more intensively in their daily work and living than other industrialized nations for a number of good, fundamental reasons, such as sparse population spread over long distances, the severe climate, the predominance of heavy industry in the industrial mix and the export of energy-intensive products, all of which get counted in as energy consumption, even though it is not consumed in Canada. We are saying that high energy intensity does not necessarily mean waste. That is not to say there is none. Of course, we can always improve.

The other point we would like to make is that the index used to measure efficiency contains factors that tend to bias the international ratings against Canada. One of those is the way they treat the chemical industry. They count the feedstocks

in these measurements; not the energy consumed to make the product, but the feedstock itself as well as the energy consumed. If you have a chemical industry that is a major factor in your industrial complex, as compared to other countries, then it hurts your standings somewhat. If you are comparing how much better Canada has done in improving its efficiency over the last 15 years or so, then having a major shift in the position of the chemical industry again hurts your improvement standings.

What we are basically saying is that before we jump to hasty conclusions about Canada's rating in the energy efficiency sweepstakes, a more comprehensive study is needed. I believe the Ministry of Energy is involved in that now.

Mr Lounsbury: Yes, they are.

Mr Charlton: A number of us are.

Mr Davies: In closing, our last comment, which you will see on page 3, deals with section 28, business ventures. AMPCO agrees with section 28 of the bill, enabling Hydro to engage in related business ventures both within and beyond Ontario. The additional leeway provided, in AMPCO's view, will work to make Hydro more entrepreneurial and will consequently benefit all of the electricity customers in Ontario. So that is a measure we do support. At this point we are happy to take questions.

Mrs Sullivan: There were a couple of areas relating specifically to the Power Corporation Act that I wanted to look at. Have you discussed your comments on section 8, relating to policy statements and direction to Hydro, with the Minister of Energy? This related to prior consultation and so on.

Mr Davies: No, we have not discussed that.

Mrs Sullivan: I think that is very interesting. One of the things that I wondered if you have taken into account is that while the Ministry of Energy would be the vehicle for discussing new policy directions with Hydro, indeed the policy directions could come from any number of areas where the government has an interest. For example, the Ministry of the Environment may have a policy that is expressed through the Minister of Energy.

I guess what I am asking you is: What kind of a consultative process do you think would be valid before that policy direction is made, no matter where it comes from? It may be an occupational health and safety matter, for example.

Mr Davies: The model under the Planning Act which we referred to is quite similar. Under the Planning Act a number of policy statements have

been issued in draft form that have resulted in approved policy statements. Some of those have been jointly issued by more than one minister. I see no reason why the model would have to differ at all. That would allow the policy statements to emanate from whatever the appropriate source was and to be released through the Minister of Energy as the government agent responsible for Ontario Hydro, and the feedback could come back through to the Minister of Energy from the public.

Mrs Sullivan: I do not know what kind of a consultative process you have been used to. In many ways these things depend on the personalities of the ministers as well as a continuing approach to consultation. But if, for example, there were a policy direction to Hydro relating to environment that came, because of the Power Corporation Act changes, through the Ministry of Energy, where would you see the consultative process taking place: with the Minister of Energy or with the Ministry of the Environment?

Mr Davies: Both.

Mrs Sullivan: You have specifically recommended a fairly formalized mechanism for consultation.

Mr Davies: Correct. To give you a concrete example: In the case of Bill 20, which is an act for development charges, that is a piece of legislation, but parts of it are administered by the Ministry of Education and parts of it are administered by the Ministry of Municipal Affairs. In the consultation process for Bill 20, people who wanted to comment on part III, which deals with education, commented to the Ministry of Education and people who wanted to comment on part I and part II, which deals with municipal matters, commented to the Ministry of Municipal Affairs.

In the case of policy statements, which have gone under sections 2 and 3 of the Planning Act, which are more analogous, for example, the food land preservation policy which is put out through the Minister of Municipal Affairs, but which starts with the Minister of Agriculture and Food. So the feedback, I think, would go perhaps through the Minister of Municipal Affairs, or in this case, through the Minister of Energy back to the ministry that had the primary responsibility for the area.

We are suggesting that the same model be followed in the Power Corporation Act amendments. It is a formal process, but then everyone knows there is some comfort that the policies will be widely discussed before they are brought into force. To use your example, if the Ministry of the

Environment were the driving force for a policy relating to Ontario Hydro, fine. It could be released jointly by the Minister of the Environment together with the Minister of Energy. I think it would really be a matter of procedure as to how the comments were sent back in.

The Chairman: Thank you, Mrs Sullivan. Mr Cureatz.

Mr Cureatz: Oh.

The Chairman: You do not have to ask questions if you do not want to.

Mr Cureatz: No, no, I am very interested, especially in the area suggesting, as I understood it, in terms of capital programs by Ontario Hydro, that they should be borne by the provincial Treasury. In other words, if you want a new plant to be built to produce electricity, you are suggesting the consumers should not be paying for the plant. It should come out of general revenue.

Mr Davies: I think you have that wrong.

Mr Cureatz: Oh, good.

Mr Davies: I think what we are saying is that if somebody wants to build a plant which has no useful purpose but which is simply being built to create jobs somewhere, then that folly should be funded by the Treasury.

Mrs Sullivan: In Mr Cureatz's riding?

Interjection.

Mr Davies: That is not what we were thinking about, anyway.

Mr Cureatz: Well then, give us an example. Have you got an example?

Mr Davies: I think generically I gave you an example.

Mr Cureatz: But I cannot envision how that relates to Ontario Hydro.

Mr Charlton: It is a concern about the section of the act, Sam, which talks about subsidizing economic development.

Mr Cureatz: Then that goes to your—

Mr Davies: These are points of economic development only that we are talking about on page 2.

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Mr Cureatz: That goes to your point then that you are supportive of Ontario Hydro supporting industries in terms of research, etc. Is that not an expenditure, your last point, business ventures? How would you classify that kind of expenditure?

Mr Davies: Business ventures are profit-making enterprises that Ontario Hydro has which are collateral to its main business.

Mr Cureatz: So you feel comfortable about that?

Mr Davies: Yes.

Mr Cureatz: I was interested that the 15 per cent is actually at a point of damaging industry, which I do not understand. I would imagine 30 per cent is at a point because industry is bearing the cost of having a cushion of 30 per cent. Am I correct on the 30 per cent bearing the cost?

Mr Nevison: Using those two numbers, if the reserve level falls to somewhere in the neighbourhood of 15 per cent, the number of interruptions that industry will feel will cost it a lot of money.

Mr Cureatz: There will be that many interruptions at 15 per cent reserve?

Mr Nevison: Yes. It does not take a tremendous number of interruptions to be very costly to industry, if you have got processes that seize up if the power is off for a few hours.

Mr Lounsbury: Fiberglas Canada in Guelph is a very good example. If they are interrupted for four hours, they are down for four days and workers are sent home for four days.

Mr Cureatz: Just with that, I want to pursue something I have been asking in the Legislature about the preferred rate on uninterruptible power. It is being interrupted so much that, for instance, Inco and Falconbridge have asked to be put off uninterrupted power.

Mr Nevison: Yes, and there is another group of industries considering the same thing. I do not know whether Mr Watson has something he can add to that.

Mr Cureatz: Anything would be helpful.

Mr Watson: I think some industries are considering getting off it. Others are considering taking it because if there are going to be interruptions, you might as well get the discount. We have got people looking at it both ways. We in our company are not convinced that interruptible power is at the right discount level right now. I think if that discount level were increased, more people might take it and plan for it.

Mr Charlton: Just very briefly, referring to your comments on energy efficiency and on energy intensity in terms of use, I happen to agree with what you have said, that it is not appropriate to generically look at Canada's or Ontario's energy intensity in terms of use and compare that to somebody else's and do some math and come out with a figure of Y times that indicates our energy and efficiency.

On the other hand, I would assume from what you are saying, because you made reference to the studies the Ministry of Energy is doing and that a number of others are doing where the efficiency comparisons are being done very specifically and very directly, that you would support initiatives and programs to try to capture for Ontario whatever efficiency potentials are real that we are missing presently.

Mr Nevison: If there is clearly identified waste, then of course we do not condone that. But you can point to energy inefficiencies, and you may have the technology to correct them, but it should be cost-effective too.

Mr Charlton: Agreed.

Mr Nevison: That is the only rider we put on it.

Mr McGuigan: A small point: I should probably know this, but would your concern stem from the fact—and here I am making an assumption—that in an emergency, say, a big nuclear plant goes down and Hydro has to make a choice of who gets cut off, it would cut you off before it would cut off householders and those sort of things. Is that correct?

Mr Nevison: No, I think that—now, I am accepting interruptible load for this. That goes even if there is not a huge emergency.

Mr McGuigan: Yes.

Mr Nevison: But if there is an emergency severe enough to require primary load cuts, then industry would expect to take its fair share but not more than that.

Mr McGuigan: I see. Has that been the practice in any cases in the past?

Mr Nevison: Generally speaking, it is not very easy to single out a particular industry. If you are cutting off a transformer station, for instance, that is serving any number of different kinds of loads, it is not so easy to segregate it. Occasionally, it is. Some industries are big enough where they are the only load being supplied from a station, but the practice, as far as I am aware, has been to use rotating load cuts and just slice a piece off here and there around the system. Then they go to another group so that the misery is shared as best as possible.

Mr McGuigan: I can certainly understand your wanting to have a good cushion of 24 or 25 per cent, but in light of recent experience and the fact that Ontario Hydro, both because of geography and because of the engineering I guess has perhaps one of the best systems in the world to manage load, to shift power, to isolate areas

and so on, is it really necessary that we have it at that 24 or 25 per cent? I say this in light of recent experience, which has been pretty darn good.

Mr Nevison: Of course, for the last few years, Hydro has enjoyed fairly hefty reserves because the load growth fell off for three or four years.

Mr McGuigan: It was 40 per cent at one point.

Mr Nevison: Everything was committed and was brought into service anyway and they ended up mothballing some plant which they are now bringing back. While the frequency of interruptible cuts is increasing, there has not been a primary load cut except for a transmission problem or a local problem, that I am aware of. There have been calls for voluntary reductions.

Mr McGuigan: It is one day a year or two days a year sort of thing.

Mr Nevison: Yes. If you get into a situation where your reserve is below, let's call it the industry standard, that 25 per cent is a number that is well understood among many utilities. Now there is a theory that the bigger the utility gets and the bigger the load gets, the smaller per cent reserve you should need. That is just a statistical thing. But we are talking about a couple of per cent. Hydro should redo the reserve study. We have recommended that to them. They say they will but they are so taken up with their demand/supply study and the program that is going to be presented out of that, that they have not got time to do that right now.

Things have changed a lot since they set on 24 per cent. One of the big changes is something I mentioned a few minutes ago, and that is the introduction of the energy management programs and the expected results from them. Nobody knows for sure just how successful they will be. AMPCO certainly hopes they will be or we think we will be in some trouble. The main point we have been making is that you should have another string to your bow. Let us get something going on the supply side. It does not mean committing a huge investment right now, but it means making up your mind that some time you are going to have to install more plant, of some kind, somewhere.

Mr McGuigan: You made an interesting point that the bigger you get, theoretically the percentage should be smaller. I could not help thinking it related somewhat to Mr Charlton's comment that in the 1970s it was seven per cent growth, but that seven per cent was on a smaller base, so possibly five per cent growth today is the same number of megawatts.

Mr Nevison: It is four per cent, I think. It depends what years you are comparing.

1500

Mr McGuigan: But they could be the same number of megawatts.

Mr Nevison: Yes. One thing that we think is not always appreciated when we see these numbers being put forward as potential savings is that even at a three per cent growth, the annual increment on a system as big as Ontario Hydro is 750 megawatts, and by the end of the century it could be 900. That is one Darlington unit. If you start fooling around with half a per cent difference in assumed growth rates, or even one per cent, in 10 years that can amount to something. The fact is that nobody knows what the growth rate is going to be.

We think 4.5 per cent is not wildly unrealistic if we compare it to Hydro's so-called high-growth scenario, which is something a little less than that, 3.7 per cent.

The Chairman: Are there further questions from the committee?

Mr Brown: I would like to get back and talk about economic development for a moment, because I have always been most uncomfortable with the whole notion of economic development, especially when you consider that power at cost, to me, seems to be an economic development tool to begin with. That is obviously meant to encourage industry and jobs in Ontario. That is why you would have hydro at cost.

I also have always been a little bit leery about the term "at cost." What is "at cost"? We had people yesterday who in their presentation told us, "We are pricing hydro at 50 per cent below cost," which you probably do not agree with. I also know, and as businessmen you know, that somebody can produce at cost for a far higher price than somebody who is making a profit. Because of market forces, you can do it better than the next guy. There are a lot of questions there.

I think that when we are talking about using hydro as a development tool, we are talking about developing new technologies and helping industries. A little bit of hydro help might just be the thing that makes the economy go here for a certain particular industry. Do you have trouble with that notion?

Mr Davies: To the extent that there is a specific subsidy that is passed through, we think that is a policy decision that is taken, not by Ontario Hydro as a business but by the government as a government to encourage whatever it

wants. To that extent, we think it should be funded by the government. If Ontario Hydro is going to be the tool, then that is fine, but we think that Ontario Hydro, for financial purposes, should stick to its business, which is the supply and delivery of electricity.

Mr Brown: This is hypothetical, but perhaps there is an industry that wishes to locate in New York state or in Ontario. They are looking at which one they want to get into.

Mr Davies: Right.

Mr Brown: They are a large consumer of energy and we are competing with New York state for this particular industry. Is it not perhaps in Ontario's interest, and Ontario Hydro's interest, to have them? We can play games with, where do we get the power to supply them? Do we get the power that is supplying them from Niagara Falls, which is relatively cheap power, or do we get it from the next plant on the system, which is relatively expensive power? There is a whole notion of the accounting that really bothers me.

Mr Davies: Yes. I think it has been traditionally felt that electricity in Ontario has been priced on an average basis so that all the people of Ontario share in all the advantages and disadvantages of the power supply network. I think it would be consistent with our position that if the government wanted to attract a particular industry into the province, then any kind of subsidy ought to be paid by the government and Ontario Hydro ought to be left to producing and selling electricity at its regulated rate. Otherwise, if you follow your scenario a step further and you have a new company come in that may or may not compete with other industries in Ontario, then its competitors are going to end up subsidizing it through the electricity rate process. That will only lead to further subsidies.

One of the things that has been relatively purist in Ontario is the fact that we do not have cross-subsidization, with one minor exception, and that is for rural rates. That is reflected in the statute. I think one of the reasons Ontario has such a good system is because we have not got into a lot of these things that can be so messy, such as various forms of subsidization and cross-subsidization. We are against that.

The Chairman: Are there any further questions?

Mr Richmond: Just a point of clarification: When the committee met last year, we heard from Hydro that one of the supply elements that the utility takes into account is the short-term

interchange arrangements between Ontario Hydro and New York State Power Authority, Quebec and Manitoba, whereby they exchange surplus or excess power on an hourly basis. This is factored in to meet a portion of the province's supply requirements.

I would just like to know, in your table, possibly in your column 8, or maybe you have done it separately, whether in fact you have factored in this short-term interchange of power between our utility and neighbouring utilities.

Mr Nevison: Yes. That is part of the "Existing and Committed" column. These are numbers that Hydro generates itself, of course, and I just used them. It knows best what it has. I just forget how much is in there. I think it is something in the order of 600 or 700 megawatts of firm capacity available from interconnections at peak time.

The interconnections are not quite as solid a source of help as one might think because the Americans have not been putting any new plant in on their side. Hydro-Québec is already saying it is going to be 600 megawatts short this winter. Everybody has just about run out of what they have installed in the past. Hydro still has a little bit in the bag in the form of mothballed generation, but that can be gobbled up pretty quickly, too.

The Chairman: Are there any further questions from the committee? Thank you very much for coming in, making the presentation, having this discussion and taking the time out of your busy schedules to be here. That is our last witness for the afternoon.

The committee adjourned at 1508.

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Levison, R. Don, Consulting Engineer; with Utility Professionals International

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No. N-6

Hansard

Official Report of Debates

Legislative Assembly of Ontario

Select Committee on Energy

Power Corporation Amendment Act, 1989

Second Session, 34th Parliament

Thursday 28 September 1989



Speaker: Honourable Hugh A. Edighoffer
Clerk of the House: Claude L. DesRosiers

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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Thursday 28 September 1989

The committee met at 1017 in room 228.

POWER CORPORATION AMENDMENT ACT, 1989 (continued)

Consideration of Bill 204, An Act to amend the Power Corporation Act.

The Chairman: I call the meeting to order and ask everybody to find a seat. Our first witness this morning is the Canadian Earth Energy Association. If you could come forward and introduce yourselves for the purpose of Hansard, you have been allotted an hour to use as you wish, although it is helpful to leave some time for questioning from the committee.

CANADIAN EARTH ENERGY ASSOCIATION

Mr DeJong: Thank you for the opportunity to address you this morning. I appear on behalf of the Canadian Earth Energy Association, which represents those interested in the advancement of earth energy. This industry will have total Canadian sales in 1990 of about \$75 million. It is widely accepted within Ontario Hydro, as well as the engineering and scientific communities, that earth energy is the most efficient heating and cooling technology available in today's market. In addition, it has extremely beneficial effects on the load profile of the supplying utility. It is in the class of what is most often referred to as renewable energy.

My purpose here today, however, is not to extol the virtues of the industry I represent but rather to provide you with what we as an association believe to be the appropriate legislative framework for the relationship between Ontario Hydro, the Ministry of Energy and the government of Ontario.

It will be our submission that the Power Corporation Amendment Act should be further amended to provide a stronger conservation aspect, that the memorandum of understanding between the Ministry of Energy and Ontario Hydro should be made more stringent and that the policy directives should be mandatory, not followed on a best-efforts basis.

From its inception and until very recently, Ontario Hydro has had one goal: the production and sale of electricity. Its measure of success was

the growth in utilized generating capacity. We submit that this should not be any surprise, given that our society measures its success in economic growth.

Ontario Hydro has functioned as the engine of the province during its drive to industrialization. Power plants were built with the certainty that in the future their output would be utilized to the maximum. Hydro was in a state of perpetual construction, always planning more power plants and always in the process of building new plants and new transmission facilities. A large proportion of the jobs at Hydro were, and are, in fields not related to the sale or production of power but rather to the planning for the production and sale of power.

This process and corporate structure explained to us what was, until about 1985, an obvious reluctance on the part of Hydro to embrace emphatically the technologies which could obviate the necessity for the construction of any further generating capacity well into the next century.

It is, we submit, beyond dispute that given the political and societal will, current levels of electricity use can be reduced by significant amounts without adverse societal impact. According to Amory Lovins of the Rocky Mountain Institute during his presentation at the recent World Energy Conference in Montreal, reductions from current levels could approximate 75 per cent using existing technologies in each of the residential, commercial and industrial sectors.

Our reasons for advocating these proposals go beyond mere self-interest, although of course that is part of our reason here. We feel that the planet is in the throes of a serious environmental crisis. The crisis is caused by man. One of the main symptoms is caused by fossil fuels. The statistics are well known and we have all heard about acid rain, global warming and so on and so forth. I think to some extent we have all become inured to them. They have been emphasized so often and they have been drummed into our heads so often that we are starting to believe that it is the normal course of events. We submit that all of us are responsible for ensuring that the trends that give rise to these crises must be reversed.

Canadians are, on a per capita basis, the greatest users of fossil fuel energy on earth. We

usually explain this by saying that our centres of population are very far apart and that our climate is so extreme. We submit that this is no longer a reason but an excuse. Canada stands in the unique position of being able to do the most good on a per capita basis for the world by a reduction in fossil fuel usage.

Ontario Hydro and other producing utilities are among the largest consumers of fossil fuels in this country. We feel it is essential, not just for Ontario but for the world, that this be reduced and reversed immediately. It is common now to say to the Philippine or Brazilian peasant, "Stop chopping down your rain forests because you're contributing to global warming." We neglect to remember that we chopped down the forests of North America. We neglect to remember that the largest consumers of fossil fuels are in North America. I suggest that it is no longer appropriate for us to point the finger of blame at others when we in this province have the technology not to burn any more fossil fuels than absolutely necessary. I submit that you in this room have an opportunity to contribute to the reversal of this trend.

The Power Corporation Act sets the framework within which Hydro must operate. It is our submission that the primary goal of this act must be to ensure a reduction in the amount of fossil fuels and hence a reduction in the amount of energy this province uses. This can most efficiently and economically be accomplished through conservation. We need to ensure that the Power Corporation Act will require Hydro to become a conserving utility striving for increased efficiency and at all costs avoiding construction of further fossil fuel plants.

As a general proposition, I would agree, and I think most of us would, with the theory that the more a utility is able to do—that is, the less restricted its mandate and the broader its scope of available options—the better. Maximum flexibility should allow the corporation the best means of achieving goals of efficiency and conservation.

Unfortunately, the operative word there is "should." Despite Hydro's remonstrations to the contrary and despite the efforts of some very dedicated individuals within Hydro, the corporation has not, until very recently, shown any determined effort to seriously advance demand management goals. Those efforts which are being undertaken are, in most cases, too long in planning and too little in result.

As is clear from a review of the Ontario Hydro Demand/Supply Planning Strategy of December 1987 and Hydro's various documents since then,

including the response of March 1989 to the select committee on energy report, while Ontario Hydro speaks about the pre-eminence of increased efficiency, it is not prepared to commit sufficient resources to improve efficiency in both the new and retrofit sectors to avoid the need for premature and costly new commitments to generation facilities.

Ontario Hydro's projections of cost-effective demand management which can be achieved in the next 10 years are only half of those projected by independent analysts and those of the Ministry of Energy. Hydro appears very pessimistic as to whether even these can be achieved.

It is not only the 10-year projections which are disturbing, however. The short-term projections are the same. Hydro's current demand management plan includes less than 600 megawatts of savings by demand management by 1993. If this was in fact all that could be achieved, I would suggest that there is no choice but to begin planning for new generation now.

If one were cynical, one could suggest that Hydro's slow entry into the demand side of the process is due to a decision already having been made that a new plant will be built and scheduled for completion in the early part of the next century. Support for this position can even be found in the final DSPS documents. This association does not necessarily agree with that cynical point of view.

The central reason for the low forecast of demand savings which Hydro projects is its policy of first reducing all energy savings only to those which can be justified on an economic basis and then manipulating the economic calculations to show that production of more generating capacity is cheaper than demand reduction. The basis of the economic analysis when it comes to conservation is that of comparing the dollar cost of producing one kilowatt with the dollar cost of saving one kilowatt. On the face of it, this position is reasonable. One dollar saved, after all, is equal in value to one dollar earned. But this analogy breaks down when several factors are considered.

First, society as a whole, I submit, benefits less from a kilowatt built than one saved. In the former case, the sole benefit is that accruing from the construction of the production facility, less, of course, the associated environmental costs. In the latter case, the benefit is not only in the production of the equipment necessary to save the kilowatt, whether it be efficient lighting, weatherstripping or ground-source heat pumps, but also the lower operating cost benefit to the

consumer and the lack of negative environmental effects. Societal effects are more beneficial, in our submission, in the case of a kilowatt saved.

Second, a kilowatt saved is really equal to 1.3 kilowatts built. This is because of transmission losses and the utility practice of overbuilding to allow for a safety margin in the case of failure or unexpected or anomalous demand. Therefore, in dealing with the numbers comparing costs of generation and saving, it is always necessary to multiply the number of raw kilowatts saved by 1.3 to arrive at the actual number of generating capacity kilowatts not required.

I would also suggest that the cost comparison of saving and building in so far as it concerns Ontario Hydro projections requires further modification. It is, from our experience, the practice of Ontario Hydro to amortize the capital cost of construction for new facilities over 40 years. The amortization period for efficiency devices is set at five years; this despite the fact that there is no evidence that the useful operating life of a Darlington is 40 years or that the benefit of an efficiency practice will be only five years.

A major unknown in all cost calculations is what real interest rates are. It is Hydro's practice in its calculations to set 4.5 per cent per annum after inflation as the real interest rate. I submit that these are very optimistic projections, especially in the light of the bond market in the 1990s and the current practices of the federal government.

Further, Hydro assumes that the cost of decommissioning a nuclear plant and disposing of the radioactive waste will have little impact on the life-cycle cost of the electricity. There is no evidence to support or deny this position. It is noteworthy, however, that Hydro has not been terribly accurate in its other cost projections.

It is clear to me that Hydro's estimate of the cost of nuclear generating rests on these faulty assumptions, yet these assumptions are the benchmark against which all other options are measured. It is submitted that the true test of the cost of a kilowatt, whether saved or built, should include hard and verifiable numbers based on equal assumptions, as well as the societal impact factor.

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I would note that the primary objective of the demand-supply program is to contribute to customer satisfaction. If it can be agreed that, given a proper economic test, many of the energy-efficient technologies will save more than they cost—and many do so even with the skewed tests of Hydro—the next issue I would

like to address is whether Hydro's policies have in some other way interfered with or been less than effective in advancing energy-efficient technologies.

The most glaring obstacles standing in the way of increased utilization are the strategic plans of Hydro as evidenced in the DSPS documents. These clearly set out that the priorities of Hydro do not include demand management except to a very modest degree, and the slow pace of initial demand management programs and their limited support would lead many to question whether even the modest goals for demand management set by Hydro in the DSPS documents can be met.

This is, I submit, contrary to the stated intention of the select committee report on the DSPS, which states at page 2, "before any commitment is made for the construction of a major new generating station, after the completion of the Darlington nuclear station in 1993, every effort be made to: maximize as a high priority the capabilities of the existing generating and transmission system;...aggressively promote private generation; and develop the remaining available hydraulic sites in an environmentally acceptable manner."

Maximization of existing resources can only occur in an atmosphere where the utility is required as a matter of course to embrace all feasible demand management and conservation tools which meet the threshold economic test. The position of Hydro to date has not been this; rather it has been indicated that although early development work may be justified, it is unlikely that actual implementation of demand options can be justified unless higher-than-median demand growth is experienced.

It is submitted that this position is in error and that the societal advantages to be gained from conservation far outweigh the costs of under-utilized generating capacity. The goal should be the reduction in electrical use without jeopardy to service, not maximum utilization of all current and planned generating capacity.

It is admitted that increasing electrical efficiency is subject to the law of diminishing returns. The improvements which offer the greatest kilowatt savings for the lowest dollar should be sought first. The amount of efficiency improvements that are less expensive than alternative supply options will not be limitless.

Relying on demand options that are cheaper than the alternative supply options contributes to lower costs to customers and enhanced customer satisfaction. This industry and, I suggest, others would be content with such a calculation

provided that the cost calculations are performed in a reasonable and consistent manner.

Another obstacle to the utilization of efficient technologies is the unwillingness or inability of Hydro to persist in the implementation of energy-efficient standards. I would just like to give you one example. Early last year, with Hydro's assistance as well as that of the Ministry of Energy and the Department of Energy, Mines and Resources, the Canadian Earth Energy Association and the Canadian Standards Association established CSA standards for both the performance and installation of ground-source heat pumps.

The Ontario Legislature recently passed the Energy Efficiency Act, which among other things mandates minimum efficiencies. One of the first industries to be regulated, and in fact the only one which actually volunteered for regulation, was the ground-source heat pump industry. The regulations under the Energy Efficiency Act called up the performance standards set by the CSA standard as required efficiency under the act.

Ontario Hydro, through its EnerMark program, offers preferential rates to consumers for electric appliance purchases, including ground-source heat pumps. Yet EnerMark does not include in its list of requirements for EnerMark eligibility compliance with either of the CSA standards. This frustrates those members of the industry who wish to demonstrate a responsible position in the marketplace. It is essential to our mind that Hydro insist on the highest standards of performance and installation, particularly when it was instrumental in the adoption of the standards. The last thing this or any other energy-efficient industry wants is a repetition of some of the debacles that occurred under the federal Canadian home insulation program.

The issue also arises as to what type of incentives or what kind of assistance, if any, Hydro should use to promote efficiency and demand management. We suggest that these should include:

(a) Public education, which would include an aggressive and active advertising campaign to educate the public on energy efficiency and its benefits: To some extent, Hydro is currently doing this.

(b) Research and development and technical information: Hydro should have a program to research and develop energy-efficient technologies. It should be targeted at those technologies that pass the threshold test. The cost of the additional research and development, of course,

should be factored into this threshold test calculation. Again, I must note that Hydro is active to some extent in this area. Recently, the corporation, the Ministry of Energy and the Department of Energy, Mines and Resources agreed to cosponsor a \$350,000 research and development program to investigate the characteristics of earth loops, which are used in conjunction with ground-source heat pumps in various configurations and soil types.

(c) Capital grants: It is suggested in the DSPS document that capital incentives should not be equal to the cost of saved generating capacity since to make them so would distort the open market and not generate income for the utility, and such a program would benefit some customers at the expense of others. We suggest that these are not insurmountable objections.

In order to address some of these issues, I would first note that the true cost of producing a kilowatt of electricity and delivering it to site is approximately \$5,050. This means that for a typical 10-kilowatt home the cost of delivering sufficient electricity will be in excess of \$50,000. The typical home, by the way, is 10 kilowatts only if it is already utilizing at least some energy-efficient technologies.

While protection of the open market is a fundamental of our society, one wonders whether it is necessarily appropriate in deciding whether or not the societal benefit of distortion of the open market in extreme cases exceeds the danger. This, I submit, is particularly true in a situation such as we find ourselves in now, which is that of a worldwide environmental crisis.

The statement that incentives do not generate income is misleading. Of course that is true, but Hydro's mandate is not to generate income; its mandate is to serve the population of the province.

Is it true that the economic benefit would accrue to some more than others? On first blush, yes, but I suggest that also should be considered a little bit more fully. The entire province benefits by the reduction in the need for generating capacity; that is, if the money is spent on new technologies it will benefit the economy in other ways, not only in the energy-efficient manufacturing sector but also by increasing the disposable income of the affected consumer.

I would just like to take you through a little exercise as to what kind of incentives can be afforded. We are not advocating these incentives, but it is an interesting exercise.

The cost of Darlington by completion will be about \$12.5 billion, which should result in the

production of some 3,500 megawatts of power. That 3,500 megawatts could be saved by retrofitting electric resistance homes with ground-source heat pumps. There is no doubt about that. The total cost of the project would be \$6 billion, but that is less than half the equivalent of generation. This is based on an installation cost of \$1,700 per kilowatt of generating capacity saved by a ground-source heat pump.

It is not advocated that Hydro or anyone else pay the full cost of retrofitting ground-source heat pumps or any other electric-efficient technology, but the example illustrates that the total cost of retrofitting is less than the cost of production. It costs more to produce electricity than it costs to save electricity.

Again, Ontario Hydro is starting to recognize this. Recently, the Canadian Earth Energy Association and Hydro have begun discussions on an incentive program that would offer \$300 per disconnected kilowatt to the home owner. It is a level of support that of course is not all we want or all we think we deserve, but it does pay for the difference in the cost between a ground-source heat pump and a regular electric resistance furnace.

Hydro's support of the industry, to be fair, does not only include financial assistance. There is scheduled for 2 February to 4 February in Toronto a meeting of the heads of all the major North American utilities and many European utilities. The conference is designed to encourage communication at all levels of the utilities with respect to ground-source heat pumps. It is going to be hosted by the Canadian Earth Energy Association and sponsored by Hydro, the Ministry of Energy and the Department of Energy, Mines and Resources.

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It is fair to say that Ontario has more earth energy installations per capita than any other area in the world, and with the kind of support that Hydro has been giving and with the proposed amendments to the Power Corporation Act, we expect that will continue.

What kind of results can realistically be expected by ground-source heat pumps?

We have indicated that the Canadian Earth Energy Association has indicated that given the support at \$300 per kilowatt and continuation of the other nonfinancial support from Hydro and the federal and provincial governments, we can deliver the equivalent of 2,000 megawatts of generating capacity savings in this province by the year 2000.

Other technologies in the residential sector have the capacity to save approximately another 1,000 megawatts. In other words, from the residential sector alone, efficiency measures could save the equivalent of a Darlington by the year 2000. It should be emphasized that this figure is only for residential retrofitting and says nothing of the reduction in projected demand if energy-efficient programs are in place for new housing construction as well as new and retrofit commercial and industrial programs.

If we agree that the goal is to reduce demand, how can this best be accomplished in the context of the Power Corporation Act?

It is our submission that the failure of Hydro to adequately advance the role of conservation and demand management in its planning process results from the inability of elected officials to influence the policies of the corporation. For this reason, we applaud the initiative of the minister in proposing the amendments to the Power Corporation Act that will result in Hydro's policies being more sensitive to the will of the people.

The priority of the PCA and Ontario Hydro after the amendments remains to provide consumers with electricity at the lowest possible cost. The amendments, however, bring into play new factors in determining lowest cost, as they and the memorandum of understanding ensure that the programs of Hydro are compatible with demand management and the government's environmental goals.

The process of consultation between the corporation and the Hydro committee of cabinet ensures ongoing dialogue and consultation.

As enthusiastic as we are about the amendments, it is our belief that they do not accomplish as much as they might. There are three main areas where the CEEA feels further amendments are necessary to ensure that Hydro becomes and remains a conserving utility.

First, on the question of construction of new capacity, it is our submission that no new generating capacity is in fact needed. There are many technologies, other than ours, which can be used to reduce demand at a cost less than the cost of construction of new capacity. I have submitted that it is preferable not to build a kilowatt rather than to build one. A mechanism should exist by which Hydro would be required to demonstrate to the government that there does not exist sufficient conservation potential at or below the true cost of construction of generating capacity before approval of any new supply options is given.

What we would like to see and what we frankly think is necessary if the old "build at all times and at all costs" mentality is to be overcome is that construction of new generating capacity become the last rather than the first option.

I indicated that the test should be based on the true cost of construction and conservation. This "true cost" will of course be open to some dispute, but there is no reason why such dispute could not be resolved before an appropriate government body such as the Ontario Energy Board. Such a body, or at least a reporting mechanism, will be in place as a result of the electricity export controls contained in the act. This or a similar reporting mechanism could surely be put in place for construction approval.

It is our further submission that the act be amended to reflect the experience of several American jurisdictions, notably Maine and Vermont. In each of these states, the relevant legislation requires the utility to show that it is making the most cost-efficient decision in relation to the acquisition, generation or saving of energy. If the true cost, including wider societal costs, were included then such a mechanism would ensure the full utilization of cost-efficient technologies.

We also, as an association, have some concern over the provisions of the act dealing with policy statements and their effect on Hydro's policies. The legislation in this regard, we believe, is intended to allow the minister to set policy guidelines within which Hydro is expected to operate. Yet the legislation indicates only that the corporation "shall respect any policy statement" and that the Hydro board "shall use its best efforts to ensure" that the exercise of its powers under the act "broadly conforms" to the policy statements.

This is, in our submission, a very big section and does little other than give the board and the corporation wording amply broad to justify ignoring any policy statements with which they do not agree. It would seem simple to require the corporation and the board to conform to policy statements with some more mandatory wording. For example, in the case of the memorandum of understanding, the phrasing is "the corporation shall comply." Why should the same not be the case for policy statements?

We applaud the memorandum of understanding mechanism included in the new legislation and agree with the position of the minister that it provides a new framework for the relationship between Hydro and the government. On the whole, we are encouraged by the prominence

given conservation in the legislation and the memorandum of understanding, as well as the new mechanism to make the corporation more responsive to the political will of the government.

We do express some concern that all future legislatures and governments may not be as responsible to the need for conservation and environmentally sound planning as this one is. I think we have a fairly straightforward example at the federal level where the Department of Energy, Mines and Resources has just been dismembered by the Mulroney government; at least, the renewable energy section of it has been.

It would therefore appear reasonable to include the encouragement of electrical conservation and compatibility of all programs with the province's environmental goals in the Power Corporation Act itself. This could be accomplished by placing these objects in the section establishing the powers and duties of the corporation. This would ensure the continuation of those present aims by any future board or government, unless further amendments to the act were made, a process which, given the increasing public environmental awareness and concern, would be more difficult than a policy statement from the cabinet.

We would suggest that enshrining the principles of conservation and environmental planning in the act would be a prudent safeguard against the vagaries of the future.

As I indicated, we are on the whole very pleased with this legislation and see it as the continuation of a process towards the ultimate goal of an environmentally aware and responsible Ontario Hydro.

Mrs Sullivan: I am interested in many of the aspects of your brief, but one of the things I found interesting in the underlying part of the brief was that you appear and your association appears to be working pretty closely with Ontario Hydro now in terms of technological development, testing and so on. I wonder if you could just tell the committee a bit more about the association. Is it an industry association?

Mr DeJong: Yes, it is an association with its headquarters in Ottawa, established approximately three years ago. It has a membership of some several hundred, including seven manufacturers of the equipment, five importers and distributors and members of utilities across the country. Its main goal is the advancement of the industry. Yes, we have received substantial assistance and co-operation from Ontario Hydro

and I do not mean to suggest the opposite. Certainly, they have been very forthcoming.

Mrs Sullivan: Do you work closely with the municipal utilities as well?

Mr DeJong: Actually, no. To date, the municipal utilities have not been involved very strongly at all in the association.

Mrs Sullivan: When you are working with Hydro, whether it is, say, on the technical side or research or development, do you also work with it at all on the marketing side? Are you developing joint marketing programs?

Mr DeJong: Marketing programs are used generically within Ontario Hydro to promote the industry. For example, they have literature promoting the ground-source heat pump industry that is located in many Hydro offices. They provide assistance to some manufacturers in the development of consistent marketing materials. Although marketing is a very proprietary thing, the market is, as I said, fairly widespread and many of the manufacturers tend to see the marketing material as proprietary, the association itself does not market the equipment; Hydro markets it generically and, beyond that, each individual manufacturer markets it.

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Mrs Sullivan: That is interesting. When we were talking about the DSPS, we spent a lot of time talking about the kinds of marketing and promotional programs that would lead to the demand management goals that have been set and that you clearly are looking at. I just wondered what kind of relationship there was.

I also want to ask you a question about your statement on page 11, which says it is your submission that no new generating capacity is needed. I wonder what kind of analysis you have done to come to that conclusion and whether that included economic analysis and so on.

Mr DeJong: As I understand the process, Hydro has prepared a series of projections based on increasing growth in the economy and therefore increasing demand for generating capacity. We as an association do not have sufficient resources to match their economists' predictions. However, based on the predictions in demand growth that we have obtained from Hydro, from the low-, high-, and medium-demand growth curves, the amount of conservation potential that we see existing in the province outstrips the amount of growth that is foreseen in Hydro's own projections.

Mrs Sullivan: Does that analysis come from a marketing point of view, from your own

marketing analysis? Is that basically what it is based on?

Mr DeJong: It is based on the amount of growth that we see in Hydro's projections and extrapolating that to the amount of potential for conservation that exists in the province at or below equivalent cost.

Mr Charlton: Would it be fair to say that your comment that no generating capacity or no additional supply capacity is necessary is in the context, as you have said, of Hydro's projections and therefore in the context of the planning time frame reflected in those projections?

Mrs Sullivan: It is in the context of every house that has electrically resistant heating moving to a heat pump.

Mr Charlton: No, in the context that there may be a need for a supply option at some time in the distant future, but what you are saying is no supply option is needed in the planning time frame that Hydro's figures deal with.

Mr DeJong: That is correct. There is certainly no way we can say that 100 years from now there is not going to be any need for further supply, but the amount of demand growth we see in Hydro's projections can amply be met by conservation methods, not just by our technology but by dozens of other technologies.

Mrs Sullivan: Over a planning period of five years?

Mr DeJong: No, I would think we are looking at a planning period in Hydro's projections of up to 40 years. I believe the demand growth scales that I have seen extend well into the 20th century. I am not just looking at five years.

Mrs Sullivan: Why do you think you have come to that conclusion and Hydro has not?

Mr DeJong: Why? That is an interesting question. I would think, from an abstract standpoint, probably because Hydro has not historically been involved in reducing demand. Hydro has been and remains, to a large extent, a utility whose function and goal is the construction and production of power. I see it as a corporate philosophy. The entire structure of the corporation is to grow, to fuel the economy through growth itself.

Many people within Hydro think the demand-side potential has not been given a close enough view. I am not certain that the upper levels of Hydro, for example, are even aware of many of the demand-side technologies. I know, however, that in the research facility many people are in agreement with us that further construction for the foreseeable future is not necessary.

I do not think the issue is why Hydro does not necessarily agree with this, but rather the issue is how can Hydro's projections and ours be more closely tied together? I think an awareness program is needed not just for the general public but also within Ontario Hydro.

Mr McGuigan: Just to continue on that line, I have listened to Mr McConnell and Mr Franklin over the years—I have been sitting on the committee here for quite a number of years—and what I hear them really saying is that they are simply carrying out the mandate—that is to build, as you say, at any cost—of the Power Corporation Act. They are doing what they are told to do.

I tend to believe them that the legislation gave them no other choice but to do as they have been doing. That sets up feelings such as you and many others have expressed that it is a philosophy and they cannot be deterred from that course of action.

I tend to think the amendments we are making in the memorandum of understanding is going to alter that course and that they will have no other choice but to follow the course.

I just wonder what your reaction is to that sort of view.

Mr DeJong: I am in agreement that the amendments to the Power Corporation Act and the memorandum of understanding more prominently feature the role of conservation. I am in agreement that is a step in the right direction. I am not certain that within the existing structure of Hydro those changes in philosophy can be accomplished.

Mr McGuigan: I guess what you are saying, and I can understand it, is that you cannot take the spots off—which is it, the tiger that has spots or the lion?

Mr Pelissero: The leopard.

Mr McGuigan: You cannot take the spots off the leopard.

Mr DeJong: It will take more than one can of paint remover anyway.

Mr McGuigan: In our democratic system, the opposition is going to stand up, as it properly should, and point these things out to the government. I tend to think you can take the spots off the leopard.

Anyway, we are just expressing our opinions here.

I have a couple of technical items I would like to ask you about. Having been on this committee, I have taken the words of all sides into consideration and I have tried to conserve hydro and one of the methods is by going to the smart

fluorescent light bulb. I find there are very few applications where you can use it. The fittings and so on, just do not work. I will not spend time on that but I find there are not many applications for them in my house and I have a house I think the same as most everybody else.

One of the rooms in our house was put on originally as an open porch. We closed it off and made a family room out of it. Our house is heated with a gas furnace. It is used very seldom because, also being in the orchard business, we have a lot of wood so we heat the house largely with wood. Going back to the porch, because of the nature of the porch, the distance away from the heating and so on, we find the only convenient way to heat it is with electricity.

I called in a contractor this summer and said, "Well, what about putting in a heat pump?" There is not a heat pump small enough, he tells me, for that. They only have a heat pump to do a house. I am just wondering if that is true or not.

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Mr DeJong: Without actually seeing the size of the room and so on, I cannot comment on exactly what size of equipment is necessary. But I am certain that there are heat pumps that range in size from three quarters of a ton to 25 tons. Three quarters of a ton produces approximately 9,000 BTU of heat and an approximate equivalent amount of air conditioning, although the calculation is not exactly the same. A unit of the size of 9,000 BTU would be used in a very small home, but as I say, without actually seeing the room—

Mr McGuigan: It might be an area to pursue.

Mr DeJong: It is very small equipment.

Mr McGuigan: I do not know the numbers but I think you will find there are an awful lot of cases where hydro is used in just such an application where the house has a primary source of heat, gas, oil or whatever and they use hydro as an extension in rooms that are difficult to reach and so on.

Mr DeJong: If I might comment briefly on the gas and wood heating of your home, while that certainly benefits Hydro's load in the sense that there is no further demand on the grid, just from the broader standpoint, the burning of natural gas and the burning of wood certainly are not, from an environmental standpoint, as beneficial as electrical use. Again, dealing with the question of the heat pump, certainly a heat pump could be sized for any portion of your home. If a contractor says there was not one small enough to

heat the home, I would suggest he was not fully informed.

Mr McGuigan: Perhaps it is something you could pursue because there must be a lot of similar situations where people do have a concern about the environment would want to use the heat pump and yet find they cannot.

The other technical question relates to your assertion that we could easily replace the 3,500 megawatts by going to heat pumps. A friend of mine, now retired, was a noise control officer for the city of Toronto. He was telling me that one of his biggest complaints he had to investigate was heat pumps that were installed not in the backyard, which is very easy in a rural-type home, but those that are installed on the roof. Then the roof becomes a sounding board and causes a lot of complaints by the neighbours. I am simply raising the question of whether you have taken into account in that substitution that there may be some constraints to doing that, at least engineering constraints.

Mr DeJong: I should first of all indicate that I hope I did not say that the 3,500 megawatts could be saved by heat pumps only. I said heat pumps and other efficient technologies.

Secondly, the heat pump to which you are referring is what is commonly known as an air-to-air heat pump which has an air handler outside and a split system inside in the duct work. Yes, that is noisy. We do not represent air-to-air heat pump manufacturers or the air-to-air heat pump industry. We are solely concerned with ground-source equipment which does not have any equipment mounted exterior to the home. The equipment is inside the house the same as a furnace is inside the house and it causes no more noise inside a house than a standard furnace would. So from a noise standpoint, that does not to my mind affect this equipment.

Mr McGuigan: But it does bring me to the point that there must be homes that do not have adequate ground area around them that could not put in a heat pump.

Mr DeJong: My home is heated with an area less than half the size of that inside these tables. The area constraints are very minimal because, if I can take 30 seconds, there are two ways of putting the ground loop in. One is horizontally, in which you lay the pipes horizontally under the earth at about six feet depth and that takes a substantial amount of space. But there is also a vertical installation possible in which drilling equipment actually comes in and drills holes vertically into the earth up to 200 feet depth. The pipe is then looped through there. Both methods

are equal in efficiency and approximately equal in cost. The amount of land necessary really is not that large.

Mr Charlton: Give him your card, and he will give you an estimate.

Mr DeJong: I already have a note here for one of our dealers to see Jim McGuigan.

Mr McGuigan: You would need a pretty big yard to bring a drilling machine in to drill 200 feet.

Mr DeJong: We will put it in your driveway.

The Chairman: Did you have a supplementary on that line of questioning?

Mrs Sullivan: It is in a way. Last summer we visited one of the research facilities at Hydro where they were doing work on heat pumps. I am not sure if they were ground-source or if they were the air kind.

The Chairman: They were air-to-air.

Mrs Sullivan: I read something the other day about new heat pump co-ordinated research that Hydro is doing in the industry organization. Is that true? Is that what they are looking at? Is it ground sources that are new projects? The other question is whether cost is involved in that research.

Mr DeJong: Yes, Hydro is currently involved in several research projects related to ground-source heat pumps. They are actually being conducted by the CEEA and funded by Ontario Hydro, together with the Ministry of Natural Resources and the Ministry of Energy.

There is a cost associated with it. The total cost of the project is approximately \$350,000, of which I believe Ontario Hydro is contributing—I am just pulling out a number here—about \$75,000. There is other research ongoing within Ontario Hydro, particularly at the Kipling research facility, relating to ground-source, which is not being administered through the CEEA and the value of which I am not aware.

Mr Charlton: Just very briefly, a couple of questions to clarify part of your presentation and perhaps get a little bit more out of you than what is here. You have said in the presentation that a kilowatt saved is worth at least as much as a kilowatt built or generated. In fact, then, you have gone on to say that it is actually worth slightly more. You have set out that from Hydro's perspective there are some problems with a kilowatt saved in the context of their capital procedure and the billing for sales of kilowatts; megawatts are harder to sell because you cannot meter them.

So there are some bookkeeping problems for Hydro. In your sample, for example, you used a minimal investment of \$300 per kilowatt as an incentive program. There have been others who have suggested, though, that because a kilowatt saved is in fact slightly more valuable than a kilowatt generated, in capital investment terms, they should be treated no differently.

Would it be fair to say that although there are some bookkeeping problems for Hydro in the context of energy efficiency, because they do not then have a kilowatt to sell and get revenue from, in a societal sense it is not an economic problem, that it is a problem in the relationship between Hydro and the government and a bookkeeping problem for Hydro? For society as a whole, if you proceeded to pay 100 per cent of the capital cost of efficiency, is there a net gain, not a loss?

Mr DeJong: I would tend to agree with that position. Philosophically, I can see no reason that as a society we should not take the path which leads to less environmental degradation and at the same time accomplishes the societal goals of providing safe and efficient electrical power. On an abstract basis, I would say, yes, there certainly is more than ample reason to fully fund energy-efficient technologies up to the avoided cost of the utility.

On the other side, and this is speaking from purely a proprietary standpoint as a manufacturer, the company I work for most of the time has the largest share of the market and we intend to maintain that large share of the market. To the extent that there is funding thrown at a technology, to some extent you distort the marketplace. Also you give rise in many cases to less than ethical behaviour on the part of some contractors. As I indicated earlier, the Canadian home insulation program is a pretty good example of how some people got ripped off.

Mr Charlton: I think we are very conscious of those kinds of problems from past experiences, you are right.

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Mr DeJong: But I do agree with you in the abstract, that from a societal benefit standpoint there is no reason why full funding of avoided costs should not take place.

Mr Matrundola: What is the Canadian Earth Energy Association? I am sorry, I do not know what this association is, who it represents, what it does and so forth. Briefly.

Mr DeJong: The Canadian Earth Energy Association is a nonprofit corporation incorporated in 1983, I believe, for the purposes of

advancing the interests of earth energy in the country. Its headquarters are in Ottawa and its executive director is Peter Scott-Smith. The association is organized along the lines of most nonprofit corporations in the sense that it has a president, a vice-president, a board of directors and members. The members are primarily those people involved in either the manufacturing or the installation of earth energy equipment.

In addition, there are members who are interested in it from an environmental standpoint. We have some engineers who specify the equipment who are members. The association's goal is to advance the interests of its members, just like any other trade association, be it the refrigeration and air conditioning association, the gas association and so on. Really, I think it is most comparable to those associations.

Mr Matrundola: I see. At the bottom of page 4 you say that \$1 saved is equal to \$1 earned. My economic computer tells me that \$1 saved is at least equal to \$3 earned, because you have to earn so much and, if you are lucky, you manage to save only one third of it. So the comparison is quite different.

At the top of page 9, I did not quite understand, "In order to address this issue it should be noted that the cost of producing a kilowatt of energy and delivering it to site is approximately \$5,050."

Mr DeJong: That is correct.

Mr Matrundola: For one kilowatt of energy?

Mr DeJong: That is correct.

Mr Matrundola: Even if only one was produced? I do not quite understand, because the cost of energy is not \$5,000 per kilowatt.

Mr DeJong: The cost of building production, generating production, the cost of building the transmission line, the cost of buying the rights-of-way, the cost of administering the program, the cost of getting one kilowatt of electricity from a nuclear power plant to the door of a house is \$5,050. That is exactly what I mean to say.

Mr Matrundola: True, but then it is amortized over a period of time. At the beginning it may be so much, but over a certain period of time it costs less because otherwise it would be impossible.

Mr DeJong: As I indicated, the amortization period used by Ontario Hydro is 40 years. But that is the raw capital cost.

Mr Matrundola: Since energy seems to cost so much and so forth, and we all are trying to advocate the saving of energy, I was wondering if a pilot project might be something to think of.

For example, say that an average household consumed in the last 12 months the value of \$960 worth of energy. Therefore, the average is approximately \$80 a month or \$160 every two months. Now, say, starting in 1990 the household reduces the consumption of energy by at least 25 per cent would save not only 25 per cent in the cost—if you were paying \$80 a month, you would be saving 25 per cent and would pay \$60—but another \$40 in reduction of the hydro bill would be given as a bonus for having saved energy, an additional bonus of 25 per cent every two months.

In this way the household would save up to 50 per cent of the cost of energy. Since the cost of hydro is so expensive and we all advocate and encourage people to save energy, therefore I feel that my idea would be a great incentive to save energy. Then at the end of 1990 we could reassess the benefits, and if it is worth while, perhaps we can continue. If it is not worth while, maybe we can discontinue this pilot project.

Furthermore, if the heat pumps are a great device for saving energy, Ontario Hydro should offer a great discount and perhaps free installation to lure people to install heat pumps and again save energy.

In the past I heard somebody say, I believe a member on this committee, that perhaps Hydro should give free refrigerators that are energy-efficient and so forth. If it costs so much money to produce hydro, I believe it is of paramount importance to offer every incentive to save energy and therefore save money. I just wanted to offer this idea.

The Chairman: Perhaps we could follow up on that during clause-by-clause debate next week.

Mr Matrundola: Thank you.

Mr Cureatz: Following up on those comments by my learned Liberal colleague—

The Chairman: And relating them to the bill before us.

Mr Cureatz: Absolutely, just as I reminded all committee members yesterday to do.

I do not want to be overly negative about the paper, and I am sorry I had to be running in and out, but I did take the opportunity to quickly read in between during the questions. I will say this for Ontario Hydro: It seems that you were certainly stressing more concern than it appears to have in terms of energy efficiency.

I just want to relate to you that Darlington is being built in my riding. Among all the other issues that one has to put up with in the

representation of a constituency, I try to keep myself informed as best I can as to what is happening at Darlington and to show up periodically.

At the same time, I also visit our rural Hydro offices just to see what is going on there. I feel comfortable that they did not particularly give me a snow job to any degree. For instance, in the building of new homes, when contractors come in, they indicate to them, after the plans have been submitted, what the expected usage of electricity will be, the possibility of building an R-2000 home, the alternative of an air heat pump as opposed to a ground heat pump and the cost differences. Just on that local level, I was encouraged to see that there was movement in terms of planting the seed, of getting people to thinking about heat pumps and in-ground heat pumps, as my colleague has said.

I do not know what you found out in the field in your area, whether you feel it is that way. There is a move. We have had a lot of witnesses say that there is no movement or there should be greater movement, and I do not deny that there probably should be greater movement, but I would certainly say that there seems to be a filtering down from over here in the glass towers out to Durham East in my riding, some kind of movement of people focusing on that kind of energy efficiency, although your paper was stressing that there should be more of it.

Mr DeJong: I agree with you that there is an increased awareness of electrical efficiency. I would disagree with you that it is filtering down from the ivory towers. I would suggest it is filtering up from the field into the ivory towers. Our experience is that the local Hydro representatives and the man at the door are the ones who are more concerned with saving their customer \$15 a month on his electricity bill than is the fellow on the 23rd floor.

Mr Cureatz: I see. That is interesting. I never thought of it that way.

Mr DeJong: His job depends on it.

Mr Cureatz: Yes, right. There was an interesting thing that was brought up about subsidies for heat pumps or in-ground systems. The people at rural Hydro indicated to me that when they lay out proposals as to the cost of electricity—they gave me a couple of examples—there seems to be a substantial capital cost outlay.

I forget the figures now, but let's say for a heat pump system it would be \$10,000 and with duct work and an in-ground system around \$18,000 or \$20,000. Although it was more efficient in terms

of consumption of electricity, if I remember, working out just a quick, capital cost outlay, you would have to be using the system 10 to 15 years, as opposed, say, to an air-to-air heat pump system to make up the difference. Are you with me?

1120

Mr DeJong: Yes. I understand what you are saying, but I would have to disagree with you on two points. First of all, the average cost of a ground-source heat pump installation in Ontario is not \$18,000.

Mr Cureatz: No. I am thinking of—they just gave me the figure with duct work and the whole thing. I may be off anyway. I am just giving you the impression that I had.

Mr DeJong: As a rule, the cost of a ground-source heat pump is more expensive than a standard, high-efficiency gas furnace and air-conditioner by exactly the cost of the earth loop, which is the mechanism which actually delivers the efficiency. The average cost of an earth loop is approximately \$2,500 to \$3,000; sometimes it is \$2,000, depending on the size of the home and the complexity of the installation.

I want to make a comment on your statement and Mr Matrundola's statement concerning air-to-air heat pumps. There are two issues in dealing with energy-efficient equipment. There is not just the issue of whether or not the equipment is efficient sometimes; there is both the lowering of overall demand and the lowering of peak demand.

The difficulty that is experienced with an air-to-air heat pump is that it is least efficient at times when Hydro's peaking problems are worst. So when it is 10 degrees below zero and the grid is called upon to pump out all the power it can possibly come up with, the air-to-air heat pump is not doing anybody any good at all because it is not functioning at anything greater than a COP of one, although there are air-to-air heat pumps that are now being—

Mr Cureatz: No. I understand. I can appreciate that.

Mr DeJong: The beauty of our equipment is that the level of energy required is constant. So it affects not just the general efficiency level but also the peaking levels.

Mr Cureatz: Okay. I do not mean to prolong this. One more question. So there is a difference in the capital outlay.

Mr DeJong: Yes, there is.

Mr Cureatz: If you figure out the difference in the capital outlay between the air-to-air and the

in-ground system, the extra money you are paying a year with an air-to-air—I just pull out figures; I do not know—may be \$100 or \$200, but your electrical bill will be \$200 more a year or maybe \$300 more a year with air-to-air as opposed to the in-ground system. You know what I am getting at. The thing is, if it is \$3,000 or \$4,000 for the in-ground system—I am trying to pursue this whole thing—how do we resolve that problem?

We want to go more to the in-ground system. If it is \$3,000 to \$4,000 more, but the difference over a year is \$300 on your electrical bill, that would mean 10 years by the time you have made up the difference with the in-ground system. How do we put a package together at Hydro so that we do not have that peaking problem and so we have a constant?

Mr DeJong: The average, straight payback to a consumer for a ground-source heat pump installation, as compared to an energy-efficiency gas furnace and either an air-to-air heat pump or standard air-conditioning, is somewhere between three and four years, not 10 years. The payback period, of course, depends on many things such as the level of insulation in the home, the temperature at which people keep the home and how big the house is. All these factors come into play. But the average payback period is between three and four years.

Mr Cureatz: Is there any way that we could work with Hydro, if this is the way we should be going? I understand it is big in Scandinavia. What do we do, I wonder. Do we do subsidies or something?

Mr DeJong: It is big in Scandinavia. Your colleague's question was, at what level of support would the industry be comfortable? Whether it would be a total avoided cost or a percentage. We have difficulties as a society by going to the total avoided cost. On the other hand, I can see that the societal benefits are so great that certainly the difference in cost between a standard and a ground-source installation should be paid, or more.

Again, it is not an issue that we have been able to identify, simply because the association is not wealthy and we cannot afford economists to tell us exactly what level of support would be most beneficial to the industry or the province. From a totally greedy standpoint, buy all the systems you want from us. We would be more than happy to sell them to you, but that is not why we are appearing today.

The Chairman: Mr DeJong, we appreciate your coming in, sharing your views and engaging

in this discussion with us on this topic this morning.

Mr DeJong: Thank you. It has been most interesting.

The Chairman: Our next witness is the Independent Power Producers' Society of Ontario. Please introduce the delegation for the benefit of Hansard. You have about an hour for your presentation to divide as you wish, but it is helpful to leave some time for discussion.

INDEPENDENT POWER PRODUCERS' SOCIETY OF ONTARIO

Mr Shepherd: My name is Jay Shepherd. I am the president of the Independent Power Producers' Society of Ontario. On my left is Jake Brooks, the secretary of the organization, and on my right is Nick Teekman, the executive director of IPPSO.

Our intention is to give a presentation of about 20 minutes. It will not follow the written brief directly. I figure you can probably read that yourselves and I do not need to read it to you. Then, whatever questions you have, I will stay as long as you like. Please forgive me if I do a little bit of hacking through my presentation. I am not normally a big cougher, but I quit smoking about six days ago, and my doctor tells me that my body is going to react by coughing me into oblivion for a few weeks.

The Chairman: We wish you well.

Mr Shepherd: It is not affecting me at all either.

I think it is fair to say that the Independent Power Producers' Society of Ontario is well known to this committee, although the last time we appeared before you in the DSPS hearings we had 35 members. We now have 104 members, as of yesterday.

Our membership is fairly diverse. It includes regulated entities such as ICG and Transalta Utilities Corp. It includes a number of large private companies such as Westinghouse, GE and Hawker Siddeley and it includes, I guess, the majority of the mainstream of the independent power industry, the medium and small companies and individuals who are producing power in small or medium-sized facilities throughout the province. I guess we also have a fair number of environmentalists in the group, since the whole industry started with an environmental bent.

We have been heavily involved in the policy development area relating to parallel generation over the last couple of years. While we certainly are not prepared to take any credit whatsoever—for blame, for that matter—for the Power Corpora-

tion Act amendments that are before you, we have been involved in that exercise. We should say at the outset that although we have some comments, the amendments on the whole, the whole package, have our 100 per cent support. We think the direction is correct. It may not be as fast as we would like, but it is certainly going the right way. We give a lot of credit to the people at the Ministry of Energy, including the former minister in particular, for pushing ahead with it.

At this point I am supposed to spend about 10 minutes and tell you all about the wonders of independent power, how great it is and how terrible central generation is. I will not. It was all pretty well in your report last year anyway. I also had a bunch of overheads, and thank goodness you do not have an overhead projector, because I hate overheads.

1130

I am not going to skip the benefits of independent power entirely. I have to say something about it or I will be fired. Clearly independent power has benefits with respect to regional development, with respect to decentralizing the generation system, with respect to involving local communities in the development of their own resources and with respect to involving native peoples in the business and generation side, as opposed to being shunted outside of the system.

It means jobs. It means shifting towards appropriate technologies and towards sustainable development. I was at a meeting yesterday about the government's approach to greenhouse gases. Clearly, here is an area where independent power is critically involved. It means reduced reserve requirements and increased energy security, a list as long as your arm. But the most important thing it means is that the people who produce the power are accountable for the economics of it, which is something we do not have right now.

I was originally going to skip this entirely, but I just cannot resist taking a few shots at central generation. It obviously is the opposite of independent power in almost all those things that I just said and has a lot of uncertainties and risks associated with it that cannot be identified or quantified today; uncertainties with respect to nuclear liability, the long-term costs of emissions, decommissioning and waste disposal costs and things like that. You can go on and on.

But again, the key thing about central generation that is a problem is that the people who make the decisions today and who advise you and tell you, "This is how much this is going to cost," are never accountable for their decisions. Never.

Twenty years from now, if the generation they said was going to cost five cents a kilowatt-hour costs 20 cents a kilowatt-hour, they will say, "That's tough luck, Charlie." There is nobody to yell at. There is nobody to answer for that.

I guess what I am supposed to do is talk about the Power Corporation Act amendments and, in fact, I tried as much as possible to make this hone in directly on the PCA.

Mr Cureatz: Don't let that worry you.

Mr Shepherd: From what I heard earlier, I feel I might be out of line to talk about the PCA.

The Chairman: A few words might be helpful, just in passing.

Mr Shepherd: For form. Well, actually everything I have to say right now is about the PCA. We really have four key points to make and they are on two issues. The first is the accountability of Hydro with respect to certain aspects of its central generation. The second is the way in which the PCA deals with parallel generation, which is also in essence an accountability issue, but in a different way.

First, dealing with central generation, what is the problem with the design and construction branch? The problem essentially is that almost everything Hydro does is reviewed or supervised by somebody, not regulated necessarily, but reviewed or supervised by somebody. Their current generation, how much it costs and how they run it is reviewed annually by the Ontario Energy Board in detail.

Their planned generation, what they intend to build later, is reviewed by committees such as this one, by the Ministry of Energy and by the government overall and is subject to what one senior person in Hydro referred to as "proctoscoping," and that is indeed the way it should be. But somewhere in the middle is what they are doing on the design and building side right now, things that do not yet affect rates and are not part of the planning phase any more because they are already happening. They are already approved.

That process—the design and construction branch essentially is what I am talking about—represents about one third of Hydro's annual expenditures. There is no review process for that at all. There is no one whose job it is to look at that and say: "What about these cost overruns? Is what you are doing still appropriate to changing policies? Five years ago we made a planning decision. Is it still appropriate to follow what is happening? Are the economics of what you are doing still viable? Have there been changed external factors that mean what you are doing no longer makes sense?" There is nobody to ask

that. It does not come to you. It does not go to the Ontario Energy Board. In fact, the OEB has made it clear that it is not allowed to look at that because it does not affect rates, not today.

Our proposed solution is this: We are proposing that the Power Corporation Act require Hydro to present an annual report to the Ministry of Energy on the activities of the design and construction branch, stating the status of what it is doing, its plans for the current and future years and whether there are any changes to them that impact on current government and Hydro policies, explanations of cost overruns and updating of all economic analyses relating to the new construction.

That is just a report, obviously. That does not really get anybody supervising it, but what it does is that it gives the minister something. At the time she makes her annual HR reference to the OEB, she can then say: "By the way, here's the annual design and construction report. Look at that too, please." We would have somebody then supervising, still not regulating but supervising that one third of Hydro's expenditures.

In fact, hopefully at some point in the next six months or a year, this committee will be looking at changes to the Ontario Energy Board Act that may include regulating Hydro. If that is the case, we will be back here saying: "You've got this report. Now let's make that one of the things the OEB regulates." There is a method to our madness here. That is the first point.

The second point, relating to the accountability of Hydro in central generation, is reserves for future uncertainties. Hydro already has a number of reserve accounts. Only one of them is funded. That is their pension fund. All of the other reserve accounts are simply accounting mechanisms. I have an accounting background and I realize that an accounting reserve has the same current effect on your financial situation as a funded reserve. However, we have a problem and the problem is that certain aspects of central generation include high risks of future costs, disposal of nuclear waste, decommissioning costs, the capital costs associated with fuel channel removal, the costs associated with the emissions from power that we export, which we charge for but treat as revenue.

The difficulty is that these are costs that when they come—it is going to be a long time from now and the people who are going to be the victims of those costs are either not here to talk about it, not old enough to talk about it or not in a position to make anything happen about it.

Why do we fund the pension fund? Why do we not just put in a reserve on the books for a pension fund? The reason is that it is a long-term liability and the people who are intended to be covered by that reserve are not in the position to ensure they are protected and therefore we protect them by insisting the reserve be funded. That is why we have pension funds as opposed to pension reserves.

Our proposal is that we create four fully funded reserve accounts for the four key—at least to date—high-risk aspects of central generation: fuel disposal; decommissioning costs; fuel channel removal, ie, pressure tubes; and the emissions associated with exported fossil fuel power. These are reserves that are already on the Hydro books. What we are asking is that they be required to be funded, fully funded like a pension fund.

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Now I have two points with respect to parallel generation. First, with respect to the rate that is paid, we are not going to go through the whole rate debate. It would be fun, but I think we are going to have hearings some time in the next six months or so where we will get a good shot at it. But there is a particular problem relating to the PCA and rates. Many of the costs associated with electrical power in Ontario are externalized. They are not costs that Hydro can recognize because Hydro does not have to pay them. They are social costs. They are environmental costs. They are nuclear liability risks, etc. Those are real costs to society of electrical generation, but Hydro not only does not recognize those as costs; it has said publicly many times it cannot. It is not allowed to. The PCA does not allow it to.

The obvious answer to that is to amend the PCA to say the cost of power includes all these things, to throw them in. I do not think, and the Independent Power Producers' Society of Ontario does not think, that is doable right now. It is a complicated issue, determining what the things are that are included. The externalized costs that are included is a difficult issue to deal with.

Therefore, what we propose is something much more modest and relates only to parallel generation. In the amendments in section 56h, which is the new provision on parallel generation, we propose a subsection 5 to empower Ontario Hydro to consider, in fact directs it to consider, social and environmental costs associated with different types of generation when it is determining what it pays parallel generators for power. It does not tell them how to do it. It does

not tell them what numbers to put in. What it says is they have to look at it; that is all.

Of course, if you can see your way clear to simply making a general statement in the PCA, cost of power includes externalized cost, that would be really wonderful, but we do not think that is realistic.

Finally, there is the question I referred to earlier on: Who regulates Hydro? That issue is one that I think will be more clearly addressed by this committee if and when changes to the Ontario Energy Board Act come to it.

However, there is a specific problem relating to parallel generation that concerns us. This is one you have seen before; that is, Hydro is the sole customer and the sole rule-maker. There is nobody to tell them whether they are being fair. We have suggested and we continue to suggest that an independent arbiter, who we suggest should be the OEB, be responsible for establishing or reviewing rates, contract terms, provisions with respect to wheeling, etc, the whole range of issues relating to the interaction between Hydro and the private sector generators.

We have proposed, and you will see it in detail in our submission, a number of specific places in the PCA where items are referred to the OEB for review. Again, if and when the Ontario Energy Board Act comes before this committee, we will then ask you to make amendments to that act to change the review to regulation.

I am not going to go through all those details. I do not even remember them all anyway.

I think we should make one final comment. In general, the approach that the Ministry of Energy and the government have taken to increasing government control over Hydro has been creative. The expansion of the board, the use of regular meetings with senior politicians, the memorandum of understanding, etc, has been creative. It has been incremental, which means that we are not having as big a fuss at Ontario Hydro as we might otherwise have and therefore as big a problem, and it is in the right direction. I do not think any of our comments should be taken as criticisms of what is proposed. We are suggesting there are some more things that can go in as well, but what is proposed is in fact pretty good stuff.

The Chairman: Are there questions from the committee?

Mrs Sullivan: I like the way you have prepared your report. I think it is easy for us to get to the recommendations very quickly. There are a couple I want to ask you about.

First of all, you talk about the calculation of the social and environmental costs, as have other presenters before the committee, not only in hearings on the Power Corporation Act but in our discussions on the DSPS last year. I wonder if you have a recommendation for methodology to calculate those social and environmental costs.

Mr Shepherd: There have actually been a number of very recent studies done in this area relating to specific aspects of social and environmental costs, one in West Germany, for example, in the last six months, a very sophisticated analysis. It is still quite conservative in its approach, but very sophisticated.

In answer to your question, I think that different types of externalized costs should have different methods of calculation; nuclear liability, for example. In other words, the cost to society associated with the Nuclear Liability Act is essentially an actuarial question. How much does this insurance really cost? Things like the cost of emissions could be a calculation associated with the costs of medical or economic impacts, or it could be looked at entirely the opposite way: How much would it cost to clean it up to nothing? That is how much it is worth.

I do not know which way is the best way. Both of them are such horrendous numbers that it hardly matters. I guess the answer to your question is that there is no one answer. There are a lot of answers, depending on what the cost is.

Mrs Sullivan: One of the areas I have a problem with is that, too frequently, in matters relating, say, to pollution questions, we do not understand at the time of the taking of the action the environmental consequences 20 years down the road, or longer. I guess the problem comes in costing in advance things that you do not know about based on matters that happened in retrospect.

Mr Shepherd: I wish I could say to you, yes, there is some magic way of doing that. In fact, I think the answer, which is the answer Ontario Hydro would give, is that you cannot. You can assess a risk, perhaps. You can get some of it by what you know already but the real answer is that if it is uncertain, then you cannot get a certain answer.

One of the things we have suggested and continue to suggest and that I think is going to happen is that the Ontario Energy Board or another entity have formal public hearings on these issues so that we can debate the issues. Eventually we will come to a judgement call, but at least all the information will be on the table.

Mrs Sullivan: Certainly, the current minister and the previous minister have indicated that there will be public discussions relating to avoided costs, and presumably the social and environmental costs will be included in that public debate. I wanted to ask you why, specifically, you have made recommendation E asking for an additional subsection to section 561 authorizing the municipal utilities to engage in the promotion of parallel generation.

My understanding is that indeed some of them are doing that and that there is no restriction on their doing it. In fact, the municipal utilities that spoke with us yesterday were in fact quite enthusiastic about some of the achievements that have been done and they mentioned specific examples in Markham and North York and so on. I wondered why you thought the current act limited their activity in the promotion of parallel generation.

Mr Shepherd: I guess it does. Let me just comment on the municipal utilities. In fact, some of the municipal utilities have been leaders in the field. You have to give them credit for that. Nobody has been patting them on the back for doing it either, including us, probably. Other municipal utilities have been total dinosaurs about it, and the Municipal Electric Association in fact recognizes that. That is not the question, I know; it is just a gratuitous comment.

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The problem in the Power Corporation Act is twofold. First of all, municipal corporations are not allowed to give incentives unless they are specifically approved by Ontario Hydro, which means they cannot set up their own program to encourage demand management or encourage low displacement and that sort of stuff unless it complies with what Ontario Hydro wants and unless they wait the two years until Ontario Hydro tells them their program is okay.

In general, I guess everything they do in the area of power generation is subject to Ontario Hydro's policies. What we have suggested here, I think, is that we say to the municipal utilities, "You have the same responsibility in your franchise area that Ontario Hydro does in the nonmunicipal utility area and you are entitled to make your own policies and do it in the way that makes sense in your area."

Mrs Sullivan: Another intervener at these hearings indicated they were concerned in particular that some of their municipal utilities were not as open to allowing the parallel generator to get on to the lines. Have you found that to be your experience?

Mr Shepherd: That is undoubtedly true. There are some municipal utilities that have said point-blank, privately of course: "We're not going to let you on our system. We have to go through the motions, but there is no chance that you are going to produce power in our system. Goodbye."

Mrs Sullivan: Why? Because they feel they do not have the capacity? I am using "capacity" in a different way than "capacity." But why?

Mr Shepherd: A number of reasons: One is that in local areas there are often local biases about people, about approaches, etc, and that is probably most often the problem.

Mrs Sullivan: It is not because they are already full.

Mr Shepherd: No. Another problem I have seen twice now is municipal utilities that have said: "We don't want you developing this hydraulic site because if we keep you off, then in five years we can develop it and we are quite happy to develop it and we would like to. In five years, you won't have the site any more and we will be able to take it and do it ourselves."

The third situation I have seen is municipal utilities that because of the complexities of their charges from Ontario Hydro, would lose substantially if parallel generators started to supply some of their power. The combination of capacity charge, standby charge and energy charge that the municipal utilities have with Ontario Hydro can sometimes, if you put a lot of new capacity on their local system, result in very expensive power from Ontario Hydro and it can mean it does not make sense to put on your own capacity.

Mrs Sullivan: Ontario Hydro has the capacity to joint-venture in parallel generation. I should know this, but I do not: Do the municipal utilities?

Mr Shepherd: Have the power to joint-venture?

Mrs Sullivan: Yes.

Mr Shepherd: I do not know the answer to that. I know that some of them are willing to do it. Whether they have the power to—I am not sure they really care because there are always ways around it. They do at any rate.

Mr McGuigan: Supplementary to that: I think it is at Barrie where they make electricity from sewer gas, or is that Orillia?

Mr Shepherd: Sewer gas?

Mr Teekman: I do not know.

Mr McGuigan: I was there at the opening.

Mr Teekman: It can be done.

Mr McGuigan: I guess it was Orillia. They make power out of sewer gas. Obviously, there is some sort of joint venture between them and whoever owns the facility. It strikes me, as I recall that operation, that they could only work so many hours a day, that there was only enough gas to operate it so many hours a day, so you get situations where it would be hard on Ontario Hydro to have to come in and supply on an intermittent basis. You can visualize dams that would not have water constantly, but they would have small dams that might have water for intermittent use, so you can see where Hydro would be involved in those matters.

Mr Shepherd: I have heard the argument from Ontario Hydro that, "Power that we, Ontario Hydro, have to supply on an intermittent basis is very expensive power." That is really not a legitimate argument, in fact. On an individual basis, of course, that power-on-demand sort of thing is very expensive, but on a system-wide basis statistics tell you that that is actually base load power being supplied, which is the cheapest power, because the demand over here is not the same as the demand as over here, because we are talking about intermittent demand, we are not talking about system demand. The argument is just not valid.

Mr Teekman: Just a further comment. I am not familiar with the facility you described, but if it can only produce power, say, for six hours a day, it would still be useful to Hydro and to the municipal utility if it ran during peak periods, if it had some storage means. That is very valuable power and would contribute to a uniform load factor for the Orillia Water, Light and Power Co.

Mr McGuigan: The system is flexible enough, then, to accommodate that.

Mr Teekman: The other thing I am not sure about is if that particular facility is a municipal corporation or an actual company. I am just not sure. There are companies which supply power, like Great Lakes Power Ltd and Gananoque Light and Power Co Ltd. They are companies, so they are not governed by the same rules that apply to municipal corporations. I do not know if that makes a difference in this particular case or not.

Mr Charlton: Just briefly—I do not know if you can actually answer the question briefly, but I will ask you to try to answer the question briefly. You basically said to us that you need somebody to arbitrate both buyback rates and the

contractual questions between Hydro and independent producers, and that you have recommended that that arbitrator be the Ontario Energy Board. Can you just in a nutshell give members of the committee a sense of why you feel that kind of arbitration is necessary? What are you running into? Talk about the buyback rate a bit, and talk about the contractual stuff a bit, too, in terms of the problems you have in that system.

Mr Shepherd: I should preface this by saying that Ontario Hydro's approach to independent power, to nonutility generators, in the last 18 months has changed dramatically. We are talking about night and day. It is still not perfect—you cannot ask for the world—but their approach is a lot better, and my guess is that if you had an independent arbitrator like the OEB, very few things would actually go to the OEB for arbitration. The value to having a third party able to broker disputes is that it keeps both sides honest. They have to negotiate in good faith and fairly, because if they do not, somebody else is going to impose their will on them. In Hydro's current frame of mind, in fact, that would be all it needed to deal with the industry totally fairly in such a way that we could hardly ever complain. We would still find ways to complain, but hardly ever.

The types of things are things like grandfathering of old contracts. It is anticipated that there will be rate hearings in the next six months or a year. Let's say the rate goes up 30 per cent. Hydro's current position is: "If you have an old contract, it must mean that that was okay and, therefore, even though our rate was wrong, was based on wrong avoided costs, you're stuck with the old contract and only the new people are going to get the additional 30 per cent." What are we going to say to them: "That's not nice"? Of course it is not nice, but they do not care.

Things like the 65 per cent capacity factor: It is basically an all or nothing situation. If you do not need a certain capacity factor—which is totally arbitrary, and they have admitted it publicly—then your rate is cut about in half, which is both inefficient and really senseless. They have said they are looking at it, but their looking at it and actually sitting down and saying, "Let's solve this problem right away," are different things, and right now there is no reason why they have to solve the problem right away. What are we going to do, close our dams?

1200

Mr Teekman: If I could just add to that, Ontario Hydro's own plants do not operate at that 65 per cent capacity factor level. If they paid

themselves what they pay parallel generators, they would be broke, that is all there is to it, because at 2.54 cents a kilowatt-hour their plants would not make money; and keep in mind these plants have been built 10, 20 years ago now. So the 65 per cent capacity factor is probably one of the biggest thorns that requires third-party arbitration.

The main reason, to continue what Jay was saying, is that the development of the power system here in Ontario has been based on principles of public power. In developing, again, this private sector generation, I think the public has a right to know that the prices that are being paid and so on are indeed fair to the parallel generators, Hydro and themselves. It seems, in the experience we see in other jurisdictions, that the only way to do that is through public hearings and so on. The Ontario Energy Board is the agency which has the background and expertise in this field to be able to handle these kinds of things.

Mr Shepherd: I realize this has ended up being a longer answer than "briefly." Let me make one other comment: One of the difficulties or potential difficulties is that Hydro will make better deals with its friends. I am not suggesting that they are bad guys or anything untoward, but in fact we do tend to be nicer to our friends than our enemies. It has been suggested in the past that they have done that to people. There are a number of people yelling and screaming right now that they did that with Intercity Gas Utilities. I do not happen to believe that, but that has been alleged by a number of people. If you have a third-party arbitrator who looks at what is happening, then most of that carping, whether true or not, has to go away.

Mrs Sullivan: This is in a totally different area, really, although not a lot, because we have been talking about the environmental cost. I recall that last summer around the time of our hearings, a company which was involved in hydroelectric generation, a private company that did not have to go through an environmental assessment process, as I recall, had a very serious problem with a dam breaking and a river flooding and so on and so on. How do you calculate the kind of environmental and social costs that are created in the private sector?

Mr Shepherd: I will make three comments. First, I know the specific situation. There are two sides to that story, and both are true. Second, the private sector is required to do detailed environmental analysis and mitigation on every project. I am not sure it is fair to say that they are

dramatically more regulated in that respect than Ontario Hydro, but they certainly have much less leverage to get things their way. On every project we have seen, the Ministry of Natural Resources and the Ministry of the Environment have been very tough on the environmental side.

However, we would be lying to you if we said that private power does not have negative environmental impacts. All power generation, every single kind, has negative environmental impacts. The issue we are talking about in the environment, in social costs, etc., is the relative negative impacts, but that is all. Photovoltaic electricity: Let's say it is real cheap today, which would be lovely; it still has serious negative environmental impacts. It is not as bad as the

nuclear facility or as burning dirty coal, but it nevertheless has a lot of bad things about it. You have to respect those problems as well as the problems of the central generation.

The Chairman: Are there any further questions from the committee?

I would like to thank you very much for coming in and making a presentation and taking the time to discuss this with us. That is our last witness for today, committee. I will adjourn now until two o'clock on Monday, when we will begin with an opening statement from the New Democratic Party.

The committee adjourned at 1206.

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SELECT COMMITTEE ON ENERGY

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Ray, Michael C. (Windsor-Walkerville L)

Runciman, Robert W. (Leeds-Grenville PC)

South, Larry (Frontenac-Addington L)

Sullivan, Barbara (Halton Centre L)

Substitutions:

Callahan, Robert V. (Brampton South L) for Mr South

Morin-Strom, Karl E. (Sault Ste Marie NDP) for Mrs Grier

Pelissero, Harry E. (Lincoln L) for Mr Brown

Clerk: Deller, Deborah**Staff:**

Richmond, Jerry M., Research Officer, Legislative Research Service

Witnesses:**From the Canadian Earth Energy Association:**

DeJong, Jacob N., Director and Counsel

From the Independent Power Producers' Society of Ontario:

Shepherd, Jay, President

Teekman, Nicholas, Executive Director



Governor
Prothonotary

No. N-7

Hansard

Official Report of Debates

Legislative Assembly of Ontario

Select Committee on Energy

Power Corporation Amendment Act, 1989



Second Session, 34th Parliament

Monday 2 October 1989

Speaker: Honourable Hugh A. Edighoffer

Clerk of the House: Claude L. DesRosiers

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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Monday 2 October 1989

The committee met at 1413 in room 228.

POWER CORPORATION AMENDMENT ACT, 1989 (continued)

Consideration of Bill 204, An Act to amend the Power Corporation Act.

The Chairman: I call the meeting of the select committee on energy to order. We will have a debate on the bill. The first thing that will happen is that each party will, if it wants, have a chance to make an opening statement. I will start with Mr Charlton on behalf of the New Democratic Party.

Mr Charlton: Thank you, Mr Chairman. My understanding is that the minister will be coming before the committee tomorrow morning and that we will be starting on the clause-by-clause thereafter. The things I wanted to discuss briefly this afternoon, and perhaps get some kind of an idea on the committee's feelings about them, stem from a matter which I discussed with you and the clerk and the other members of the steering committee about a month ago.

As you may recall, I had raised the issue of reporting other than the bill to the House and, through our discussions with the clerk and the checking that she has done, it is clear that this is not possible. We have only three options in terms of what this committee reports to the House: We either report the bill as it is printed, we report the bill as amended by the committee or we fail to report the bill. We cannot report anything else other than that.

I have also had discussions with the clerk about whether there is any prohibition on this committee—and I believe there is not—to the committee perhaps agreeing, at the end of its process, to send a letter to the Minister of Energy (Mrs McLeod). We have a couple of options here: either suggesting the minister follow up a number of other issues that have been raised with us during the hearings or, if the committee cannot come to an agreement on whether or not the minister should follow up those other matters, at least reporting those other matters to the minister as having been concerns that were brought to the committee by the various sectors interested in Bill 204.

That is the one issue I would like to have a brief discussion on this afternoon, although we do not have to resolve it. I just want people to start thinking about that possibility. I would prefer the committee's sending a letter to the minister asking that the following issues which were raised with the committee be pursued by the minister and the ministry, but I would rather see a letter just reporting those issues going to the minister than nothing at all.

I think people know what those other issues are from the presentations that we had. We had a number of presentations that focused on and recommended specific changes to the bill, and I presume we will be dealing with those during clause-by-clause discussion, but a number of those same presentations set out specific other things that people felt were necessary in order to make the whole package work.

I guess the specific reference is to an ongoing regulatory mechanism in terms of Ontario Hydro and its whole process; not just rates, but planning and proposals. Although our presenters were certainly not unanimous, in terms of a review process versus a regulatory process and the place for that to occur, I think it was fairly universally presented to us that at least some kind of mechanism needs to be in place, whether it be review or regulatory in nature.

That is the focus of my concern and that is what I would perhaps like to hear some comments on from the committee this afternoon, in terms of a secondary way of dealing with matters that are not directly related to Bill 204 and therefore that we cannot deal with as amendments to the bill and either pass or defeat, but which people feel relate to the issues Bill 204 is trying to deal with.

The Chairman: Are you moving a motion?

Mr Charlton: I do not particularly want to move the motion today. I wanted basically to raise the issue today to see if I could get some kind of a sense of the committee's feelings. Just on the basis that it is usually better when committees can come to some kind of a consensus at the end of it all, I wanted to see if I could get some sense of people's feelings about the approach of a letter to the minister before I actually drafted something, so that in its drafting

I could take into account the comments I heard today.

Mrs Sullivan: Mr Charlton raises some interesting points about the mandate of the committee and indeed what its freedom to operate is now in terms of making other recommendations to the minister or to other places.

I certainly do not believe we have done enough examination of issues, nor have we reached a consensus in the committee in order to relate any kind of recommendations from the committee to the minister for action. I do not think that has been part of our mandate this time; our mandate has been more specifically to deal with Bill 204. Although there are some issues on which we may have a consensus, there are other issues on which we certainly would not. We have not discussed some of those issues outside of the context of Bill 204. So I would not be supportive of a letter going to the minister indicating the committee in any way had a consensus for action.

There is merit in a letter to the minister outlining some of the issues that were raised by the presenters, and indeed by the committee in its own questioning, as a report to the minister. I wonder, from a practical point of view, if indeed the minister does not already have that information, because her parliamentary assistant has attended through the entire time and will presumably be making a formal report to the minister on those issues. As well, of course, Hansard has it recorded. That is my only reservation about any kind of report.

Additionally, there was quite a diverse spread of views from the witnesses in some areas. I do not think we, as a committee, were able to discuss those in adequate depth to report any kind of unanimity from witnesses. I think that is problematical even in a report situation.

1420

Mr Charlton: I think that is basically why I put out the two options. Neither of those options suggested this committee would recommend action on a specific matter, because I already sensed that kind of consensus was not here. The two suggestions I was making for slightly different letters would be, first, the committee's recommending that these issues were raised with the committee and should be pursued further and the second was just a simple reporting of those other issues that were raised with the committee. I think one is slightly stronger than the other, but neither was intended to be a recommendation that the minister implement X, Y or Z because, as I say, I just did not sense that kind of consensus

was here in this committee because we had not been in a position to pursue those issues at length.

I agree with the member to the extent that consensus likely does not exist. My reason for wanting to see a letter go to the minister is simply that I believe the other issues are important issues that need resolution in the very near future and any weight that could be added to the urgency to make a final decision on those issues by a letter from this committee, as opposed to the committee just ignoring those issues—yes, the minister's staff has been here and no doubt will be reporting those other issues to the minister—is that this committee can just basically say to the minister, "Although we are not recommending which way you should go on these issues, these are important, outstanding issues around which resolution is needed in the near future in order for the system to be able to progress usefully," wording to that effect. Whatever weight we could add to ensure that they are seen as issues that must be resolved before the system is complete, if you like, one way or another, whether or not we recommend what that resolution should be, would be useful.

Mr McGuigan: We would like to accommodate any member in making that request. When you really analyse it and bring it down to the trenches level, it seems to me the place to make those concerns known is in the debate when clauses are taken one at a time. When amendments are made, those things can be brought forward and put on the record during a debate.

To use an extreme example, the government members on the committee would not want the committee to find itself in a position where it was endorsing a letter that might conflict with a position it had taken on a clause or on a resolution. I would be kind of nervous about that.

I think, in summary, the debate stands by itself and gets the message to the minister of where our concerns lie. I would like to accommodate the member, but I just have trouble resolving those issues.

Mr Sterling: While I did not have the pleasure of hearing most of the submissions, one thing does strike me in terms of the request that Mr Charlton is making. That is, when a committee hears at fairly great length various people who have an interest in the area, you should not waste the combined knowledge of those people. You should not waste the time of the members of the Legislature in not only what they can do within the confines of Bill 204 but what they might be able to do outside of Bill 204.

Therefore, I do not find the request as a challenge in any way or a judgement with regard to Ontario Hydro but only a flagging for the minister that there are certain issues that should be addressed, perhaps, on the basis of what we have heard. I think that is pretty harmless. I would hope that other members of the committee could support Mr Charlton's efforts in trying to utilize the time of the members and the combined knowledge they have picked up from the various groups that have brought forward their presentations.

Mrs Sullivan: I want to ask a procedural question. I understand that what Mr Charlton is asking us is a bit unusual in terms of what this committee has now been asked to do and so on. But ordinarily, if there were a report or a decision or a consensus of a committee being sent somewhere, would it not go to the Legislature rather than to a minister?

The Chairman: The committee would report to the Legislature. The situation when the committee has been given a bill to deal with is that it can do only one of three things: report the bill, report the bill with amendments or not report. Unlike the deliberations last summer, when we had a report from the select committee which was then tabled with the House, we have no authority to do that. In essence, we cannot report to the House except by reporting the bill.

Mrs Sullivan: Has this ever been done before—a committee sending a letter to a minister?

Mr Charlton: Certainly, yes.

Mrs Sullivan: I did not know that.

Mr Charlton: Just let me give you some background in terms of what happened here. My original intention was to try to have this committee, when it reported the bill back to the House, report the outstanding issues that are not able to be dealt with in Bill 204. After discussions with the clerk, and the clerk is correct, it is just not possible, under our rules, to do that.

The rules are very clear. We report the bill, we report the bill with amendments or we decide not to report the bill. Those are the only three options we have in relation to Bill 204. That is why I talked further to the clerk about whether or not this committee could send a letter to the minister. It has been done before and there is nothing to stop us from doing that.

While I have the floor, I will just deal with both Mr McGuigan's comments and Mr Sterling's comments. I appreciate your support, Mr Sterling. Again, Mr McGuigan, because I

understand there is not a consensus here in the committee, my intention is that I just do not want to see these issues get totally lost, because they are important. Whichever way they are resolved, your way or mine, it is important that they be resolved.

Why I wanted this discussion this afternoon was so that I could try to hear your comments and draft a letter that you could support. That is exactly why I started this discussion this afternoon, so that I can go away and draft a letter that we can all support that will at least point to issues even if it takes no positions on any of them, so that you will not find yourself in the bind of having to vote for or against something because you voted a certain way in the House last December on my resolution or any other particular item like that.

I understand the problem if the letter is drafted in that way. I guess what I am trying to do is just to have this committee say something about a range of issues so that they do not get lost and so that we give a focus to them as a committee and we say we think the resolution of these issues is important, regardless of which way you decide. You have to come down on one side or the other so it is clear to everybody what the game is.

1430

Mrs Sullivan: I wonder if Mr Charlton could describe to the committee what he saw as the process. For example, we would presumably do clause-by-clause and then have an informal discussion about what we wanted to say to the minister.

Mr Charlton: Yes. My intention was to bring in a draft proposal which obviously the committee could either reject, adopt, amend and adopt or anything else. That is why I said I thought I would have this brief discussion this afternoon to get a sense of committee members' feelings so I would not go and draft something inappropriate. But yes, deal with the outstanding issues at the end of clause-by-clause.

Mr Sterling: One of the things that becomes a reality in this Parliament, with the very large majority that the governing party has, is that it is very difficult for committee members to ever have a report passed, for instance, by the committee saying anything that might in any way be deemed adverse to the government or government interests.

I understand that kind of an argument and that kind of thing. I think what Mr Charlton is trying to do here is not waste the time this committee has gone through by writing a fairly soft response to that to the minister. I think if the committees

are to have any kind of function other than to vote when told to vote, I do not find this very startling or unreasonable.

Mr Lipsett: I would just like to say that I do not feel the other issues will get lost. I believe the public review hearing process the minister has referred to and some of the areas that have been discussed outside the realm of the bill, such as rates, avoided costs and those types of things, will get the attention we hope they will. I know I will be carrying that message back to the minister. I just wanted to assure you of that.

Mr Charlton: Just in response again, I have no doubt that the reviews are going on in the ministry and that the issues in question are being looked at. As an example, there are a number of members of this committee who have been on this committee for the last couple of sets of hearings the select committee has had. There are a number of members, for example, who, during the debate on my private member's bill last December, felt sure that when the minister came forward with the amendments to the Power Corporation Act, it was going to be part of a package, along with amendments to the Ontario Energy Board Act and a number of other items that were still outstanding. As a matter of fact, some of the members of this committee said that in their speeches in the House.

I guess what I am saying is yes, we know the reviews are going on. A number of us feel it is urgent that some of these decisions be made. As I said, whether it is Mr McGuigan's position that ends up being the government position or my position or anybody else's position, those questions need to be answered before the system can really work at all. I guess that is the point here. All I want to do is nothing more at this stage than to have the committee say to the minister that this set of issues is urgent and needs resolution.

Mr McGuigan: I do not think we should close our minds to this. If Mr Charlton wishes to write a letter and all of us look at it and make a decision

at that point on whether we would be interested in it, I do not see that there would be any harm done in looking at it.

The Chairman: Shall we then take this as notice that Mr Charlton will be writing a letter and that something will be done with that letter?

Mr Charlton: Yes.

The Chairman: That disposes of that. Mr Charlton, did you have any further comments or any opening statements regarding the bill itself?

Mr Charlton: Not at this point, no.

The Chairman: The minister will be having a statement tomorrow. I understand Mr Cureatz will be back tomorrow and may have some comments on behalf of the Progressive Conservative Party. Are there any others?

Mr Sterling: I have one with regard to Mr Charlton's response. I will leave the other response for Mr Cureatz, our critic, for tomorrow.

Mr Charlton: I think that is my position as well. Now that the minister has had reported to her the presentations here before this committee, her remarks tomorrow may give us some indication of some of the questions, for example, that I am concerned about and that I talked about in the context of this letter. It may change the whole focus of what I might say this afternoon, so it makes sense to say it after she has spoken tomorrow.

The Chairman: You mean that after her comments you may not want to write a letter?

Hearing no further comments, is there a motion to adjourn?

Mrs Sullivan: So moved.

The Chairman: All in favour? Carried. This committee is adjourned until 10 o'clock tomorrow morning.

The committee adjourned at 1437.

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SELECT COMMITTEE ON ENERGY

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South, Larry (Frontenac-Addington L)

Sullivan, Barbara (Halton Centre L)

Substitutions:

Cunningham, Dianne E. (London North PC) for Mr Cureatz

Morin-Strom, Karl E. (Sault Ste Marie NDP) for Mrs Grier

Sterling, Norman W. (Carleton PC) for Mr Runciman

Clerk: Deller, Deborah

Staff:

Richmond, Jerry M., Research Officer, Legislative Research Service

Witness:

From the Ministry of Energy:

Lipsett, Ron, Parliamentary Assistant to the Minister of Energy (Grey L)



Hansard

Official Report of Debates

Legislative Assembly of Ontario

Select Committee on Energy

Power Corporation Amendment Act, 1989

Second Session, 34th Parliament

Tuesday 3 October 1989

Speaker: Honourable Hugh A. Edighoffer

Clerk of the House: Claude L. DesRosiers

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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Tuesday 3 October 1989

The committee met at 1030 in room 228.

POWER CORPORATION AMENDMENT ACT, 1989 (continued)

Consideration of Bill 204, An Act to amend the Power Corporation Act.

The Vice-Chairman: Good morning, members of the committee. I see all parties are represented. We are going to start with a statement from the Minister of Energy.

Hon Mrs McLeod: Recognizing that we are little late in beginning, I would like to take few minutes to make an opening statement, as this is the first time I have had a chance to speak to the committee since I have come in as Minister of Energy. If you do not mind my taking a few moments to do that, I will tighten it up a little so that I do not use too much of the committee's time to make a few comments.

First of all, I appreciate the opportunity to spend some time with the committee this morning. I regret the fact that precommitments of my predecessor made it difficult for me to spend more time with the committee since assuming the portfolio. Could I express my appreciation to Ron Lipsett, coming in as my parliamentary assistant, for taking over the responsibilities of working with the committee on this very important piece of legislation. Thank you, Ron.

I do believe that this legislation that was introduced by my predecessor, Bob Wong, is responsible and balanced legislation. I believe that the Power Corporation Act amendments and the memorandum of understanding represent one step—I think it is a major step—towards building a new and vital relationship between Ontario Hydro and the government, and that, in turn, clearly will contribute to a better relationship between the utility and the people it serves.

This new relationship will be closely monitored and regularly assessed and, if necessary, further amendments will be considered to reflect newly evolving government objectives and public concerns. But I do believe that in recent months there has been a positive shift in the relationship between Ontario Hydro and the government. This change might be described as a growing willingness on Hydro's part to meet public concerns and government objectives.

Hydro has played a significant role in a number of recent initiatives which convey this new spirit of co-operation and responsiveness. Just to mention one or two which seem particularly important to me—perhaps you will forgive a certain northern perspective in recognizing one or two of these initiatives—as a northerner, I was particularly pleased when Hydro responded to a key government priority for service to remote northern communities. As you know, in March it lowered the rates paid for electricity in these communities to the levels paid in other rural areas and also announced plans to improve the quality of service it provides to remote communities.

As well, there was the important part that Hydro played in the plans for the new cogeneration facility on the site of the Boise Cascade pulp and paper mill in Fort Frances. The project will produce steam for the company's boilers and 87 megawatts of electricity which Hydro will purchase. A low-interest loan from Hydro will help meet the cost of the \$100-million plant.

I have been encouraged in the two months that I have been in the portfolio by these initiatives and by other signs of Hydro's responsiveness. Certainly, as I know Bob Wong was, I was pleased with Hydro's acceptance of a larger role for parallel generation. I think, as you people will recall, it was with the encouragement of government that Hydro set a new target of 1,000 megawatts of parallel generation by the year 2000. We are still somewhat more ambitious in this particular area. In the summer, Bob Wong announced a parallel generation policy with targets of 1,000 megawatts of parallel generation capacity by 1995 and a further 1,000 megawatts by the year 2000. We will be working both with Hydro and with independent producers to ensure that this goal can be achieved.

When the new amendments to the Power Corporation Act were reviewed by cabinet, I supported them mainly because they would strengthen Hydro's ability to pursue and encourage demand management and energy efficiency measures. I firmly believe that before we are to consider new supply options to meet energy demand, we have to ensure that we are making the best and most efficient use of the energy supplies that we have. We owe it to the environment, to the economy and also to the

principle of sustainable development, with which I have been becoming much more familiar in recent weeks.

I had the honour of hosting the annual conference of federal and provincial energy ministers last month. The theme of that conference was energy and the environment. I think the theme reflected the public's concern about the environmental effects of our production and consumption of energy. We came away from that conference, as provincial energy ministers, with a renewed commitment to that principle of sustainable development. I think we recognized that if we reduce our need for increasing energy supplies, we will also be reducing the strain on our resources. That is why I believe that Bob Wong made demand management and energy efficiency a top priority for the Ministry of Energy. I intend to continue that policy.

Of course, demand management and energy efficiency are also good for the economy, because reducing the energy-cost component of our products helps create jobs by making our economy more competitive in world markets.

Demand management and energy efficiency are also important because they reduce the need for new facilities and give us some breathing room as we consider the energy supply choices facing us. There is no doubt that we will have to make some decisions about these supply options in the near future, and the choices are not going to be easy.

The conference of energy ministers gave me a new appreciation of the complexity of our energy supply options and particularly their environmental repercussions. Ontario is already Canada's largest energy user and our demand continues to rise.

I believe that my mandate as Minister of Energy must be to do everything in my power to ensure a reliable supply of energy at reasonable prices. To accomplish this, I believe we must examine all our options carefully and with open minds. At the moment it appears that choosing a mix of energy options may be the best way to meet future energy demands. Encouraging greater demand management and energy efficiency would be our first option in the mix.

Once we have reduced our demand as much as possible through these measures, we have several other options to consider to meet the demand. Developing new energy technologies and alternative fuels are among our options. We can also choose to enhance existing supplies, purchase outside supplies and encourage more parallel generation. Building new generating

facilities, if they are considered necessary, is also an option.

This fall Ontario Hydro will be delivering to me its preferred plan for meeting the province's demand and supply requirements for the next quarter century. The demand-supply plan will be subjected to extensive public review. Together we will examine Hydro's plans in light of our needs, the advantages and disadvantages of supply and demand options, and the costs, including social and environmental costs.

The ministry will not hesitate to communicate our concerns to Hydro, just as was done when Hydro set a 5,500-megawatt target for energy efficiency and parallel generation for the year 2000. We thought they could do better and we urged them to achieve higher targets.

I want to assure you that in carrying out the review the full range of options will be considered. Inevitably, however, we in Ontario will have to make some crucial energy decisions. I believe that with the new legislative amendments and the memorandum of understanding in place, the government and the Ontario public will be in a stronger position to face the energy decisions it will have to make during the next few years and we will be able to play an active, ongoing role in the development of Hydro's plans to meet Ontario's future energy needs.

Thank you, Mr Chairman, for that opportunity to just say a few words in a general context. I would be happy to meet with the committee and dialogue in any way you think is appropriate.

The Vice-Chairman: That is a statement that has aroused some questions.

Mr Charlton: I have some questions that I would like to proceed with later, but I would like to proceed to make some comments on the bill and the process here along the lines that the minister has just outlined for us. I think I will make the statement that everybody was trying to get me to make yesterday afternoon.

I appreciate the minister's comments this morning because she has included all of the things about which I have some concerns. So into that focus I would like to express some of those concerns.

First, I see Bill 204 as the first step in the right direction. If the minister would refer back to Hansard and the debate in the House on Bill 204 on second reading I think she will understand that although we intend to support the bill and perhaps move a few minor amendments to it—just for purposes of clarification in one case, direction in another case, and protection in a third

case—in a substantial way we support the direction that is set out in Bill 204.

On the other hand, and I have said this before and I will repeat it now, Bill 204 by itself does not fulfil the intent which is clearly set out in your predecessor's opening statements and his remarks on Bill 204. It creates the legal authority for those things to happen; it does not create the practical ability for them to happen effectively.

That takes me into the second part of my comments around the process. The minister has said, and repeated her predecessor's assurance, that when Ontario Hydro's preferred plan is tabled with her this fall and presumably with the Legislature and the larger general public, that it will be subjected to a careful public review.

1040

We accept that commitment, and believe that that process will go on. Our concern is that that process cannot go on to the fullest extent that it should without a number of other things being resolved fairly quickly. The question of how we put in place a mechanism to monitor, review and perhaps even regulate Hydro's future planning processes, the question of how we resolve issues like avoided costs, the buyback rate, the way in which we will make the decisions at each stage, have to be an integral part of the review of Hydro's preferred plan. I guess the best example is the example that is provided by the question of avoided cost and the buyback rate.

This committee, your ministry, any other panels you may set up to review Hydro's preferred plan, any other agencies you may opt to choose as a review mechanism for Hydro's preferred plan, will not be in a position to adequately assess that plan in the absence of some firm knowledge of what the buyback rate will be and how it will be determined into the future.

We will never be in a position to adequately address the question of, in this case, parallel generation, co-generation, etc, the adequacy of those proposals in Hydro's plans, if we do not know the context in which to consider them. The same is true with energy conservation. If we do not have some kind of clear indication of the government's direction, of the government's preparedness to participate in both the funding of and implementation of energy conservation or energy efficiency programs; if we do not fully understand your willingness to deal in those terms, we will not be in a position to adequately assess Hydro's commitment to energy conservation. I would like to dwell on this particular issue for just a few moments.

You have seen the studies that were released this summer; there are studies that have been done for your ministry over the course of the last couple of years which show a considerable range of possibilities out there. The extent to which those possibilities can be achieved will clearly depend on the extent to which we are prepared to go after them. I refer specifically to comments in the last round of reviewing Hydro's own documents around the demand-supply planning strategy where Hydro officials have clearly said, for example, at the one extreme, "If you pay the total cost of energy efficiency, there will be no need for a new generation facility in Hydro's mix before 2005." This is substantially different than the kind of numbers Hydro uses when it talks about 4,500 megawatts of demand management and the need for an addition to that parallel generation and another supply option.

So the range is all the way from that bottom package, which appears—although we are not going to know until they actually table it with you—like Hydro's preferred option, to the other extreme. It is time that we understood that it is not going to be Hydro's decision that decides whether we take the bottom option, the top option or some other option in between, because that is not Hydro's mandate. That is your mandate and you are the one we are going to have to depend on in the context of what we are talking about in Bill 204 on policy statements and giving direction to the future of Hydro.

It is the minister and the Ministry of Energy that are going to have to set that policy and make those decisions about how far we are prepared to proceed with energy conservation, first on the list, and with parallel generation and industrial cogeneration, hopefully second on the list, before we get into the questions of another major supply option in Ontario. It is important for a number of reasons.

First, as was apparent in many of the presentations before the committee last week—I am sure your staff have reported this to you—there are some very strong feelings among a number of groups and organizations around this province that the environment is not being adequately addressed in the present process; that neither, on the one hand, the environmental impact of decisions that are made or, on the other hand, the full recognition of environmental cost in the decisions we make are being addressed.

For the first time in a long time we have an opportunity to deal with those issues at the front end of the process in a meaningful way. It is important that in fact we do that; that we do not

lose the opportunity to be able to deal with environmental impact and environmental costs upfront rather than be in the position we have been in for the past 15 years while we try and wade through, for example, the acid rain question and its resolutions of trying to deal with environmental impacts and environmental costs of those impacts as an afterthought, as an approach to patching up a bad system; in some cases, by trying to cut back on coal-fired generation, in other cases by trying to scrub coal-fired generation, and even, in some cases, looking in the middle between those two options at lime injection, which is a partial solution. We do not want to be in that position again, in another 15 years, of trying to repair bad decisions. So it is important that they be a major part of the upfront discussions that revolve around any review of Hydro's preferred plan.

And for those reasons, these other decisions have to be made and made quickly. We need a decision from you. We know—it has been said a dozen times by your predecessor and you have restated that commitment today—that the question of avoided costs and the buyback rate will be subject to some kind of a review. We need a decision on what that review will be and we need that review happening fairly quickly, because the findings of that review have to be part of the review of the preferred plan. Regarding the whole question of how we, on an ongoing basis in the long term, monitor Hydro's performance in terms of delivering energy efficiency and in terms of delivering the real cost-effective potential for parallel generation, we have to make decisions on the monitoring and the review process. The commitment is there to provide but the definition is not yet set out. We need those definitions and those understandings and where we are going with that review process.

I will just end my comments at this point, and perhaps ask a couple of quick questions, by saying that I agree with the minister wholeheartedly that the decisions we will be making in the next 18 months or so will be crucial energy decisions. It is important that they be made with all of the cards on the table and not just part of the package in place.

The Chairman: Would you be satisfied if we had Mr Cureatz—

Mr Charlton: Yes, I can wait for my questions until Mr Cureatz has made any comments he wishes to make.

Mr Cureatz: Thank you. Madam Minister, it would be remiss of me not to congratulate you personally, although I sent you a note, on your

appointment. I am sure my New Democratic Party colleague and critic of your portfolio and I are looking forward to an interesting next two years in anticipation of some of the events that will take place regarding Ontario Hydro and energy.

1050

While I have the opportunity—and although it is not particularly on topic in regard to the legislation, but that never has seemed to hinder the committee to date—I do have some concerns which I think will unfold at some future time with regard to your other portfolio.

Hon Mrs McLeod: We can turn it into energy.

Mr Cureatz: Well, I am doing that, because in anticipation of decisions that may have to be made with regard to energy, I somehow anticipate that you could be in a situation of some conflict with regard to your other portfolio. I think it will be an embarrassing position, because a question that will be asked is, "What area are you representing to the best of your capacity, especially around the cabinet table, making those decisions affecting both, which can be two diverse areas?"

Actually, I can appreciate, when the announcement was made, some understanding of why they would be fit together, because there could be a yoking—especially in the north, I am anticipating—of both energy and natural resources. But when push comes to shove, one of the areas would have to suffer in the decision-making process. I think that leaves you in a very delicate position. I can think of more conflicts; question period time. It is an interesting area of trying to balance those two areas. Could you respond at the conclusion?

Hon Mrs McLeod: Did you want me to respond to that?

Mr Cureatz: No, at the end; I think that would be fair to my NDP colleague if you do that. I would be interested to hear your comments on how you are going to be approaching those areas.

I want to say, especially, that I appreciate the Premier (Mr Peterson) and the present administration continuing the committee. We get jovial from time to time and kibitz about the existence of the select committee, but even I, who have had the opportunity of sitting on a number of them for the past many years, actually found some of last week's witnesses provocative, especially the major power producers, among others, in terms of what we have to be anticipating for decisions regarding energy. I found their testimony inter-

esting, along with my NDP critic, who indicated that there is still the balance of environmental concerns.

It is going to be difficult. We had the opportunity I guess last year—Mr Charlton brought it up—to learn about Lakeview, for instance, and limestone being put into the stacks to try to help acid rain. But there is a spinoff problem from that which people had not anticipated until after it was done.

These are the kinds of areas, quite frankly, that I do not expect you personally to have all the right answers to, but in going into my next area of concern, I am expecting some kind of direction in leadership. My approach has always been that the present administration is going to try to put off as long as possible any decision about a major power source until after the next election. I still do not think you have any alternative but to go nuclear, be it at Darlington B or something up on the North Channel. I think there is another site people have been looking at further in eastern Ontario. However, we will know soon enough, I suppose, if Ontario Hydro does come forward soon, with proposals under the demand-supply option.

In conjunction with that, I apologize for missing your opening remarks. If you have repeated, I apologize. I am interested in that kind of involvement with the Ministry of Energy.

Let me conclude by going back to these hearings. I appreciate that the committee was struck again in anticipation of a new chairperson, who I am very confident will do more than an admirable job if we have the opportunity to continue to sit in the springtime. Those areas which I think we should be investigating will be the demand-supply area, which is going to be crucial, especially if Ontario Hydro comes up with a decision, and then—and this was my question—there is the involvement of the Ministry of Energy. Exactly what will be the focus? Will it be through this present legislation? since maybe it would be nice to tie my discussions back into the bill. Will it be after the enactment of the legislation, tying in the Ministry of Energy acting on the new bill that will be passed in terms of greater involvement of the executive council in directing Ontario Hydro?

I had commented earlier, half in jest but actually half seriously, I guess a couple of weeks ago, that this bill is, to my way of thinking, more of what a Conservative administration would bring forward than what I had heard in the past from previous Liberal opposition positions, who traditionally, over the last number of years,

looking over the various critics from Vince Kerrio to Julian Reed and others, have been shown to be very aggressive in terms of the area that my colleague indicated, be it environment, cogeneration, utilization of small hydroelectric possibilities across the province or greater conservation.

What I see in this legislation is more of a catch-all framework allowing you then to go into that next step. I do not want to put words in the mouth of my colleague in the opposition party now that we are the third party, but to my way of thinking he wants to go at it now. I admire him for that and that is the way I would have thought the Liberal administration would have gone, to have laid out the program. We would be discussing the various issues and avenues.

As it is, under this legislation all I see is that there will be an overall framework, that the government will get more involved, that there will be greater directions to Ontario Hydro. What those directions are—there is time, I guess, for the story to be told at a later date—may be some of the areas of investigation for this committee, among others, to investigate.

That is not to say it is wrong, because as I say, it would seem to me a Conservative approach would have taken that time. As they used to say, put the file on your desk for three weeks and the problem seems to go away after awhile. It resolves itself. I do not think this one is going to resolve itself. I have done that with a few constituency problems. I have learned by experience, and then take the credit when it is all resolved.

I do not think the energy one is going to be resolved, because it is crystal-ball gazing. We on the opposition side, as closely as we work together in some areas of energy, in our crystal-ball gazing, have a difference of opinion as to what can or cannot be done. It is up to you, Madam Minister, to eventually decide what your anticipation is in terms of the crystal-ball gazing and the direction you are going to go.

Not being the hard, dogmatic Conservative that one or two other colleagues of mine are, I will merely say that we will give you some extra time again in developing a program. I envision some kind of step-by-step program after Ontario Hydro comes forward with its supply option proposals, whether or not that program is, back to my first comments, a co-ordinated look by your ministry, sending some aspects of that investigation to this committee in the springtime and, finally then, a decision maybe next summer in terms of what will be done.

Certainly, I will be pushing you with some degree of feverishness over the fall session of the Legislature as to what your views are on the programming of making a decision about how either we are going to produce more electricity or, along my New Democratic Party colleague's line, the manner in which more electricity is going to be saved.

In conclusion, I would like to hear your thoughts, as my colleague the member for Carleton (Mr Sterling) indicated last week, some discussion—I think it is on section 30; I forget the section, if somebody could help me out—about the transmission of electricity to the United States in the event that we do not have enough electricity in Ontario, indicating, Madam Minister, that I really feel it is so much smoke and mirrors. Of course, I anticipate your response back, because if I were in your chair I think I could answer adequately back as to what my question is. However, that is that we are so integrated on a grid system that it is not so easy when you visit Richview—have you visited Richview switching station?

1100

Hon Mrs McLeod: Not yet.

Mr Cureatz: Not yet. Well, it is a good place to visit because then you will have—

Hon Mrs McLeod: If I have a future opportunity to do so I will do it.

Mr Cureatz: Well, you are so busy with your two portfolios, you see, that you cannot divide all your time up. But when you visit Richview you will see that it is not so easy just to flick the switch so that the little electrons that are flowing from Niagara Falls will not go any more across the Niagara river, down into Buffalo or New York city or Texas, which is as far down as they go.

I think you are being cute that you are trying to bring in this section that we—Listen, I had some very nice comments to be made about you about being chairperson, and now you are there smugly twirling in your chair and I can only remind you about what was David Peterson's sixth issue—"There is no deal"—and after the election we never heard about the sixth issue. But here he can throw this one up and say: "Well, don't forget we did something about power. Those rascals are not going to get our electricity. We put it in legislation, Bill 204." But the reality is that they are not going to do anything about it anyway, because you cannot turn the switch. We are all interconnected. So I am a tinge disappointed in your trying to be cuter by half in bringing in this

legislation. Even water I could sort of half understand, but not electricity. Even water there is some debate about, but let us stick to electricity. So those are my comments.

Mr McGuigan: The Latin for "water" is "hydro."

Mr Cureatz: Well, we will not get off on to other areas of discussion as often as the committee is wont to do.

Hon Mrs McLeod: Shall I respond to that? I think Mr Charlton also had some questions, but you would like me to respond to that set that is on the table?

The Chairman: Go ahead and respond. Before we forget Mr Cureatz's—

Mr Cureatz: Some of the Liberal members may have something to say.

The Chairman: —questions, perhaps you could respond.

Hon Mrs McLeod: Maybe just to take a few minutes initially, because I think there will be a certain attempt on my part to integrate my responses to what both Mr Cureatz and Mr Charlton have said.

First, maybe I could deal with what I think is the fairly sensitive issue you raised initially, and that is the joint portfolio; my response to issues where there is, perhaps, a different perspective, different concerns that each of the ministries will bring to bear on that particular issue. I think, as you have noted, that there can be a very constructive working relationship on shared issues between the two ministries and, obviously, that is the starting point in terms of what we would want to achieve.

But I guess in an issue in which there are different perspectives to be represented by Natural Resources and by the Ministry of Energy, should that occur, I have a fairly fundamental belief that when you are attempting to find the best resolution to a problem, you must take into account the very perspectives, and what you are looking for in the best policy direction is a balance in the perspectives. So I am not sure that I anticipate that being a conflict. I anticipate that being a way of ensuring that all the perspectives of both ministries are brought to bear in finding a solution to a particular problem.

Also, another fundamental belief is that when we are dealing with the really difficult choices, that understanding of different perspectives has to go beyond the expertise and viewpoint that is resident within either or both ministries, and has to extend, obviously, to colleagues in the Legislature and also to the public more broadly.

So for me, it is not so much a question of conflicts of interest, it is a question of how we bring the very perspectives together. I am not naively optimistic that that kind of understanding of different perspectives, particularly when it is based on a really broad consultation, makes it easier to make choices. But I do think that that is the only way in which we can achieve really good policy direction. So I am not uncomfortable that part of my role will be to bring to bear the perspectives of two ministries plus whatever broader consultation we can bring to bear on any of those issues.

I suppose the issue of public review takes us into two questions that have, I think, been raised by both of you, one being—and I put it into the context of a regular ongoing review of progress towards targets that have been established: How well are we doing in terms of the implementation of the intent of the Power Corporation Act amendments and how well are we doing in terms of looking at the relationship between the government and Ontario Hydro and Hydro's responsiveness to government direction? I think that is an issue we have to deal with, a process by which that kind of review is carried forward.

I do not have something specific to offer to the committee today other than to say that this is an issue we are talking about within the ministry and that we will want to come forward with a process for regular review. We are cognizant of the fact that this has to take place, and certainly this committee has been a very important factor in carrying out that kind of review over a number of years.

The other review aspect is on the supply/demand preferred options study Hydro will be tabling. We are committed to a very intensive public review. You have acknowledged that and I do not need to reiterate it: It does have to look at issues of need and costs as well as options.

My sense of the tension between the comments that each of you has made is the tension that is going to exist as we go into that period, first of all, of receiving the preferred options plan from Hydro and also looking at a process for public review. That is the question, how long will it take to carry out that review process before decisions are made and to what extent does that jeopardize the concern for reliability of energy supply? I think that is the issue Mr Cureatz is raising, but I do not think it is completely separate from the issue Mr Charlton is raising which is, how do we determine what the need is before those choices are made unless we have very aggressive

programs of energy efficiency and energy conservation in the meantime?

For me it is not a question of putting something on the table while we study it because I think if we were to do that we would not be able to judge what the need will be at the point in time at which we have to make a decision. The only way we are going to be able to judge need is if we are able to have in place now aggressive programs of energy efficiency and conservation so that we can test the reality of them.

Again, I think that reflects the debate I have been reading in the submissions to the committee and also in the public forum on the belief that there is much more that can be done with efficiency and conservation and the counterbelief that those goals may not be realistic. I think the challenge for us, even as we look towards the review of the preferred options plan of Hydro, is to have the kind of support for energy efficiency and energy conservation and parallel generation that allow us to test the reality of what can be achieved so that we really can talk about that in terms of future needs and choices that will have to be made.

I think those have to be concurrent programs and be seen to be integrated. I certainly concur that the whole issue of avoided cost has to be dealt with very early in order to be able to test the reality of what can be achieved on the parallel generation side, as well as then to look at the consideration of options in the future.

I think I may have touched on the other issue you raised that you wanted to comment on, the free trade reference in the Power Corporation Act. You are fully aware, as I am, obviously, of the discussion and debate that went on when the announcement was made that this amendment would be introduced.

I agree with you. I am obviously very much in a learning mode in terms of the Ministry of Energy, but my first briefing note had to do with a period in which the reliability of supply was momentarily challenged. I was impressed with what goes into place in responding to a threat to immediate provision of energy in terms of an integrated network. There really is a very highly integrated network. I think that is reality. But I do not think, as I understand the amendments related to free trade that were introduced by Bob Wong, that that is the issue they really address. I think there is a broader issue that needs to be debated and that those amendments are a signal for that debate.

For me that has something to do with the question of responses to energy crises and being

able to ensure sufficiency of energy, of electricity, to meet needs, and the extent to which the continental energy policy comes into play even though we are in a situation where we have no right to manage the conservation issues, the energy demand issues that could lead to a crisis or prevent a crisis in energy. It seems to me it is that more fundamental issue that is being raised with those particular amendments.

Maybe I will stop at that point. I think I have touched on a number of the questions that were raised. I will pick up the ones I have missed.

1110

Mr Charlton: I have several specific questions in relation to the bill which may help me in terms of some of the possible amendments I mentioned earlier.

On the first question, we may have to go to your parliamentary assistant for some assistance. He and I had a discussion about this after the presenter was here last week. It deals with section 14 of the bill, which is section 34 of the act, this new section replacing the current section. It deals with questions around Hydro facilities and easements and the process for compensation in a case where damage to property results.

The question that was raised with us last week was that essentially the process seemed to work well up front. When there is a new easement and Hydro goes in and puts a facility on a new easement and there is damage resulting, there is a process in place that adequately addresses the problem. From the perspective of the presenter, the reverse was true 20 years later. When subsequent damage occurred, the process did not seem to flow as well.

This particular presenter is, I understand, now in court and was unable to relate all the details of her case to us because of that court case. I have had a look at the section here and, to be frank, I am not sure. It seems to say to me that what is there at the beginning is always there, but if that is not happening in practical terms, I am just wondering, first of all, whether in fact it is your view and the view of your legal counsel that this should be the case, that the process should always be the same in relation to somebody's right to compensation.

Hon Mrs McLeod: I am not sure whether Mr Lipsett has had an opportunity to pursue that following your discussion. I would certainly want to get some advice from our legal department, as you have indicated. I am obviously not sure whether that is a single case-specific

situation or whether there is a broader concern and the legislation perhaps—

The Chairman: There will be researchers preparing a report, will there not, on that issue?

Mr Yeager: Yes, that is right. Susan Swift of our group has been talking with our other lawyers in the research service. She has also contacted Hydro and the Ministry of Energy lawyers. Just in passing, she does not believe there should be a problem later on, based on what is there. That paper should be available shortly. I will ask her to meet with the committee and discuss the matter.

The Chairman: How short is shortly?

Mr Yeager: Probably this afternoon or tomorrow morning. I think it is completed.

Mr Cureatz: If I might clarify in my own mind, what you are saying is that you feel uncomfortable that if there is some kind of injurious effect later, after an easement has gone through, it would appear that there might not be any kind of compensation provision?

Mr Charlton: I am not saying that I am feeling uncomfortable. The wording that is here seems to me not to restrict the process to the front end. The presenter last week seemed to be saying to us that it did. I guess what I am asking for is some firm comment from those who understand the process and legal counsel that in fact the rights are protected at all times. I am not feeling uncomfortable at this point. I just want to know the answers to those questions that were put. We cannot make judgements about legislation around one specific case, but if as Mr Yeager said, there is a general problem, then we may want to deal with it.

Mr Lipsett: Just for clarification to you, Minister, the presenter did not feel in her presentation last week that she had the option of the board of negotiation for her easement problem at a later date rather than what she encountered. I think we do look forward to the research report. We seem to have a general consensus that this access is there, but we look to the legal advice to clarify that.

Mr Charlton: I think the committee would want to ensure that the access is there somehow, if it is not.

My second question relates to subsection 12(4) of the bill, which is subsection 20(7) of the act. CUPE Local 1000 which represents those employees of Hydro who are unionized raised the concern with us that subsection 20(7), as it is being proposed here, "The corporation may establish other pension plans in addition to the Ontario Hydro pension and insurance plan"—it

had no objection to the sections. What it was concerned about was any impact the creation of new plans may have on the existing plan. In general, the request was for some wording in that section that made it clear that if there was any resulting impact from the creation of a new plan, the proposal for a new plan would be subject to negotiation with the union because of the impact on the existing plan.

I am just wondering whether you would have, first, any comment on that, and second, any objection to some wording in that subsection that would just ensure that process was how things would occur.

Hon Mrs McLeod: I think it would be important for me to see the specific wording of any amendment that was proposed. Obviously, there are a lot of issues related to pension discussions and negotiability of pensions, which is an ongoing issue in other sectors, as you know, as well as the whole issue of the due consultation process that takes place in considering changes. I think the precise nature of the amendment would be something I would need to look at.

Mr Cureatz: In conjunction with that, if I might, I discussed about one or two directors who were lawyers and Hydro negotiating with the law firm about the pensions. Is that the right story? I am not out on a huge fishing expedition, but I think it might be worth while just to pursue it. It should look fair, not only be fair. Can you repeat it? What exactly was the problem? Do you remember? Am I close?

The Chairman: The CUPE local raised an issue, if I remember correctly, of members of the board of directors of Hydro being associated with law firms that also did legal work for Hydro, which is not an unusual event in the corporate world, but they did raise the issue.

Mr Cureatz: That is right and it is specifically in regard to the pension problem.

The Chairman: I do not think it connected; I think there were two.

Mr Cureatz: Did it not? Oh, I thought it did.

The Chairman: I believe they raised the pension issue as just questioning why there were extra pension powers, and they also raised this issue of members of the board.

Mr Cureatz: There was something specific that they mentioned.

Mrs Sullivan: If I might, I think there were two issues they were raising. One was the specific question of members of the board receiving personal benefits through their corporate interests, but the other one, which I think had

more of a general impact, related to their questioning about a law case they are taking themselves now to determine whether or not the board of Hydro ought to be making decisions relating to the pension plan when some of those decisions may have a corporate financial impact on the operations of Hydro itself and on the financial capabilities of Hydro.

Frankly, they are in the middle of a court case on it. They have indicated that to us. It seems to me that any other pension plan that is a defined-benefit plan would be in the same position, so it seems a sort of funny position for them to be taking, but it is in litigation.

Mr Cureatz: Thank you.

1120

Mr Charlton: I have some questions around section 8 of the bill, which creates the new section 9a of the act dealing with policy statements, and section 9b, which deals with the memorandum of understanding. My questions relate to specific words that are used.

In the new section 9a, you are talking about policy statements and words like, "the corporation shall respect any policy statement," and other words like, "the board shall use its best efforts to ensure that such exercise broadly conforms to any policy statement." When you are dealing with the memorandum of understanding, the words are much tougher. The words are words like, "the corporation shall comply with," in the memorandum of understanding. Those are very clear words. They give a clear indication of what is happening and what the responsibility is. Perhaps you could just make a few comments to us about why the difference in the approach.

I will give you an example of why some of us are concerned about the different wordings. It is very unlikely, for example, that in the memorandum of understanding the minister is going to set out a specific energy conservation program, although you may. But the minister may, once having consulted with her cabinet colleagues and got approval from the executive council, proceed to try to implement a major energy conservation program where, regardless of where the funding is coming from, whether it is coming from the public Treasury, from Hydro's revenue or from some combination of the two, it would be desirable, certainly, to have Hydro living up not only to the spirit of that energy conservation program but to the letter of its implementation.

It is likely that that conservation program is going to end up in the area of Ministry of Energy policy, rather than as something that is negotiated as part of the memorandum of understanding,

especially since conservation programs will change, as the minister has said, as we are able to assess realistically their viability in terms of implementation. Maybe you can just explain to us why you have taken the different approach and what your view would be of somewhat toughening up the wording in the new section 9a.

Hon Mrs McLeod: Obviously you are quite correct in recognizing the difference between the wording in 9a and the wording in 9b with the memorandum of understanding. My sense of the difference in wording, not having been the original drafter of the legislation, is that it does deal with quite different components of intent.

In section 9a we are dealing with the requirement that Hydro, to use the exact term, "shall have regard for the policy direction of government." In the memorandum of understanding we are talking about, first of all, recognizing clearly the accountability of Hydro to government and setting out some very specific ways in which that accountability is exercised through reporting procedures and earlier reporting procedures and through requiring documentation that can be reviewed.

So I think that the "shall comply" clearly sets out the processes through which that accountability will be evidenced, whereas in 9a I think that we are talking about a change in the relationship between the government and Ontario Hydro. I think the wording there has been fairly carefully chosen to reflect a regard for the role of Hydro's appointed board and I think we have to continue to respect that role. What we are wanting to achieve is a responsiveness to government policy, but to achieve that responsiveness in a co-operative way.

Therefore, the wording of the legislation is really deliberately chosen to encourage that kind of co-operative responsiveness to government direction. You indicated at the beginning of your comments that you felt this legislation was one step in an evolutionary process of building that relationship between the government and Hydro. I think this is an appropriate way of taking that step, and obviously in the section 9b memorandum of understanding and accountability side of it, we are going to be doing the reviews to ensure that this is producing the kind of relationship that we are seeking.

The Chairman: Mr McGuigan, did you have something on this point as well?

Mr McGuigan: Yes, it is on that point, when the minister is finished.

The Chairman: I believe the minister is finished.

Mr McGuigan: We are going to need some clarification from legal people opposite or legal people here on behalf of the minister. It strikes me that this whole section 9a puts a reverse onus on the board, in that any time it might do something at variance with a policy statement it would have to justify that statement or that policy.

You can all think of exceptions to every piece of legislation that you ever write on any subject, but in the past they did not have to justify anything. It seems to me they now have to justify. In subsection 9a(3), the last line is "shall report to the minister whenever it does exercise a power or duty that relates to a policy statement." It strikes me that also implies that whenever they do something which does not relate, they would still have to report to the minister when they do something that does and does not. Perhaps we could get some clarification on that.

Hon Mrs McLeod: I guess I would share your assumption that the reporting is a report on achievement of policy directions, as well as a reporting of operational achievement. So we are not talking about simply what has happened; we are talking about what was intended, what has been achieved and working towards those goals. That would be part of the reporting and would be an expectation we would have.

Mr Charlton: I have one further question, but I want to pursue this just for one moment further. I do not disagree with the minister. We all certainly hope that the evolving new direction for energy in Ontario, and specifically for electrical energy in Ontario, will see a whole lot of co-operation between the ministry and Hydro that is not necessarily a forced co-operation.

On the one hand, in legal terms, you negotiate a memorandum of understanding with Hydro which sets out a certain range of responsibilities and reporting mechanisms that it has to comply with. On the other hand, you set up a review process that determines, in some kind of public review on energy efficiency, for example, that it is reasonable to achieve a certain amount of energy efficiency in Ontario, an amount which is perhaps somewhat higher than Hydro's predictions.

The minister decides, having reviewed the kind of evidence that was presented in that public review, that the public review is a good one, that the findings of that review are good and the minister wants to say to Hydro, "Get there." So you issue a policy statement that we expect Hydro to achieve this particular level of energy efficiency in this time span. What does "broadly

comply" mean in that context? When has Hydro then fulfilled its legal obligation to the minister? Is it hitting 50 per cent, 55 per cent, 60 per cent or 72 per cent of whatever the target is?

1130

Do you see what I am getting at? Sometimes policy statements are very general in nature and other times you will want to issue policy statements, policy directives or whatever you want to call them that are much more specific in terms of some of the things we are trying to get at here. That is my concern with the wording; it is not necessarily to eliminate any ability for the ministry and Hydro to be co-operative with each other.

But it is a question of enforcement mechanisms, that once you as a government and as a minister of that government have made a decision that something should happen, that Hydro should fulfil that obligation, you want to ensure that in fact it does happen. I do not see how you necessarily have what you are looking for with words like "broadly comply."

Hon Mrs McLeod: I understand the concern. I think, again, that we are at an early stage of a different relationship between Hydro and government. Obviously, our intent as government will be that the policy directives that we provide be based on a very good analysis of what is possible. One of the conditions you set out in raising the question was that that in fact would be the case, that there would be a broad public review, that there would be good technical advice and that the policy direction we set as government would clearly be seen to be realizable. That would be responsible policy-setting on our part.

The implementation of that policy in Hydro's having due regard for and broadly complying with that policy direction is nevertheless, again, that realistic achievement of the policy direction. There needs to be a certain amount of room for Hydro being able to say what they have or have not been able to achieve and why they have not been able to achieve the full measure of the policy directive, if that is the case.

That is where that regular review process that we were talking about earlier has to be an effective one. We have to have a capacity to sit down and look at what has been achieved and what has not been achieved, whether there is some aspect of a policy directive that has not been achieved and why it has not been achieved.

If at that point we identify some concerns about limitations of what we have in the Power Corporation Act, then that is something we can

look at at that time. But I think at this stage we have an appropriate framework to both set policy direction and to expect Hydro to have due regard for that policy direction and work towards its achievement. What we need then is a review process for how well that is working.

Mr Charlton: We will leave that one. One last question and it does not deal directly with the bill; it deals with an issue we were dealing with earlier.

We had an indication from your predecessor in June that the public review of the question of avoided costs would happen this fall. Is it still your intention to see that it happens this fall and are we any closer to making an announcement about the forum for that review?

Hon Mrs McLeod: The forum for the review is under very active consideration, so I hope, yes, that we are closer to having an announcement as to the specific nature of the review.

What I think is important is that we look at the way in which the avoided-cost public review integrates with the public review process which we have committed ourselves to in the preferred option study. That is what we are involved in right now, considering how the two interrelate. We are very much aware that the avoided-cost question has to be dealt with early in order to get on with the programs of parallel generation that we talked about earlier.

Mr Charlton: But you do not know if it will be this fall or not then?

Hon Mrs McLeod: I would be hesitant to put a time on actual commencement. We will have a review process announced, I hope, fairly shortly.

Mr Cureatz: I have one further question and that is an area that has been of some interest to me with Darlington coming on stream or close to it, we hope.

By the way, I am pleased that the town of Newcastle in my municipality has entered into an agreement with Ontario Hydro over a concern that it had about safety procedures, which I was concerned about also. I give credit to—I believe it was Ontario Hydro that hosted, or was it the OPP, Solicitor General's office?—the emergency outline that took place at one of the hotels close by, which I attended.

I thought it was very useful that some groundwork was being done as to what would take place if there was, as Hydro says, a "significant event" happening at the generating station, be it Darlington, Pickering or Bruce. I presume that they have something going in those areas. More particularly in my riding of Durham

East, I was pleased that they were trying to co-ordinate.

They showed us a videotape—I somehow do not think it is all going to work out that well; it will have to be practised—about schoolchildren being moved, and you are talking about thousands of children, and the parents being told. Sometimes my wife and I have trouble matching up our three boys together on a day, never mind trying to do it with thousands of children and thousands of parents.

Mr Charlton: Is that the one where they run screaming in single file?

Mr Cureatz: Close to it, Brian. However, that is a compliment. I hope it is still going to be pursued.

Under the Power Corporation Act, if memory serves me correctly in an area on which I have had numerous correspondence over the years, in regard to the grant in lieu of taxes to municipalities, it has struck me passing strange about the kind of formula that is used by Hydro under the act to give the host municipalities of generating stations funds in lieu of the taxes that would normally be charged.

Of course, in Newcastle we are under fair market value assessment as of 1985. So if one took fair market value assessment on a \$12.5 billion plant, you are talking a substantial amount of money: \$8 million or \$10 million a year. I am practical and I am not looking for those kinds of tax funds, but I think that in the scope of things there should be a review of the method by which calculations are done by Ontario Hydro, because it is set out in the Power Corporation Act. I think there should be an updated investigation as to what kind of appropriate method could be used that is fair to all concerned.

I do not think the present legislation addresses that. It is out of date, especially in light of the fact of the horrendous capital costs involved and what a local municipality has to put up with. So somewhere down the line someone in the Ministry of Energy should, I think, give consideration to—what else?—maybe the select committee on energy investigating, in one of its tangents, what did take place in the ministry's evaluation of the present act, the grant in lieu of taxes, and what could be done to amend it so that host municipalities would feel more comfortable.

Hon Mrs McLeod: That is a good suggestion. I can take that under advisement.

The Chairman: I thank the minister for coming and speaking to us and answering questions.

I understand that Ms Swift's paper on the easement problem will be available just after lunch. Is that right, Lewis?

Mr Yeager: That is right.

The Chairman: Perhaps what we should do in view of the time is adjourn now, and she will be here at two o'clock.

Mr Yeager: Two o'clock.

The Chairman: Lewis is very nicely committing her to be here at two o'clock.

Mr Yeager: She has to leave by 2:30 pm.

The Chairman: She has to leave by 2:30 pm, so perhaps members could take note of that for the point that they arrive. We will adjourn until two o'clock and we will have her explain the nature of her paper. I think the summary of witnesses will be available and we will start clause-by-clause this afternoon.

The committee recessed at 1139.

AFTERNOON SITTING

The committee resumed at 1406 in room 228.

The Chairman: I call the meeting to order.

Mr Cureatz: As I indicated at the beginning of these sessions, on this particular Tuesday I have to absent myself for a prior speaking engagement. As a result, I will not be here if you are entering into clause-by-clause this afternoon. Since other members of our caucus are detained on other committees, unfortunately our caucus will not be represented this afternoon. However, it is my understanding that you can proceed. If we continue on tomorrow at 10 o'clock, we will be in attendance.

The Chairman: You have no objection if we proceed to votes on clauses without a Progressive Conservative member present.

Mr Cureatz: No.

The Chairman: Members of the committee, you have before you a paper from Susan Swift of legislative research that deals with the issue that came up during the hearings on easements and the rights individuals might have. Susan, perhaps I could ask you to take us through this. We could have a brief discussion, if there are any questions, after you have done that.

Ms Swift: Certainly. Based on a review of the legislation, a search of the relevant law and discussions with senior legal counsel at both Ontario Hydro and the ministry, I have concluded that the information provided to the committee, last week I believe it was, with respect to easements and the Power Corporation Act and Bill 204 is incorrect. In other words, the existing legislation and Bill 204 both provide a statutory compensation mechanism for land owners who have been aggrieved by the exercise of Ontario Hydro's powers under the statute.

The confusion perhaps lies in the wording of sections 23 and 32. That is where the powers of the corporation can be found. If you look at those—I have summarized them briefly on page 2—I think the important ones are in the first paragraph; that is, the corporation is granted two different types of powers, if you will.

One is to acquire property, by all different kinds of means, and the second is to deal with that property, that land. Under the act, land includes all kinds of interests in the land, which of course would also include an easement. With respect to the powers to deal with the property, among others the corporation is empowered to "develop, utilize, use, maintain, operate and

improve" the land "for any of the purposes of the act."

Similarly, in section 32, which is the section dealing with how the powers are to be used by the corporation, it provides that "whenever the corporation has been authorized by the Lieutenant Governor in Council to exercise any of its powers with respect to conducting, conveying, transmitting, distributing, supplying, furnishing or delivering power, it may enter upon, take possession of and use for such time any land that the corporation considers to be required for the due exercise of any of its powers."

In other words, it may use the land it has acquired in whatever means for whatever period of time it considers necessary.

I think the only conclusion that could be drawn from reading the statute is that the powers, as I said, are twofold. First are the acquisition powers and second are the utilization powers, if I can call them that.

Under the current act, section 34 outlines the compensation scheme that is available to an aggrieved land owner for damage to property resulting from the corporation's exercise of any power under sections 23 or 32. As I said, the powers under 23 or 32 are the two types of power. The scheme does not distinguish between a power of acquisition and a power of utilization.

Essentially the scheme provides that where damage to property occurs, either the corporation or the owner may submit the matter to a board of valuation to determine the amount of compensation. The board is appointed by the Lieutenant Governor in Council. Pursuant to the act, there is a right of appeal. If either the owner or the corporation is dissatisfied with the determination of the board, there is a right of appeal to the Ontario Municipal Board and a further right of appeal to the Divisional Court.

In addition, under section 35 of the existing act, damage to "crops, gardens, shrubs, trees or other growing things" is recoverable under the same procedure but subject to a 60-day notice requirement. Failure to give notice within that required time does not necessarily result in nonpayment or lack of compensation, and if the board of valuation determines that there was a reasonable cause for the delay and that the corporation has not been prejudiced, it may award compensation. But in that event, the award is final. There is no right of appeal.

The compensation procedure under section 34 is not mandatory and the act is otherwise silent about the land owner's right to choose to pursue the claim through the courts. In discussions with Ontario Hydro, I am advised that Ontario Hydro considers these are alternative courses; that is, a land owner may pursue his claim for compensation either through the courts or through this compensation scheme, but in respect of the number of claims it receives for property damage, the number that go through the court system is minuscule compared to the number that go through the section 24 procedure.

Bill 204 repeals section 34, but essentially retains the same procedure for compensation. I think the main change to the scheme under Bill 204 is that it is now to be administered by the board of negotiation under the Expropriations Act instead of the board of valuation. Compensation is still to be paid for property damage resulting from the exercise of any power under sections 23 or 32. I am advised by the Ministry of Energy that the change in boards is in effect just a streamlining change because the membership of the two boards at this point is virtually identical. The Lieutenant Governor in Council appoints both boards and the membership is the same.

Similarly, subsection 35(2) of the act is repealed under Bill 204. That just matches up the administration that exists under the new section 34; that is, the determination of compensation and reasonableness of the delay in giving notice is now a function to be determined by the board of negotiation under the Expropriations Act.

I think that is essentially what I can tell you about my view of the legislation and Bill 204 with respect to the rights of easement holders. Perhaps I should add, though, that there may be matters that exist under an easement agreement that would have to be determined by a court. I think you have to read the statute carefully and be aware that the compensation scheme applies only to property damage. Construction of the agreement itself or any matters dealing with personal injury of course would not be dealt with under that section.

Mr McGuigan: To take an example, if there were a drainage ditch or stream passing through a property on which Hydro had an easement and Hydro came through, cleaned out and put spoil that interfered with the use or value of the lands, it would be legal for Hydro to do that under the maintenance and damages could be awarded to the person for the spoil under the program.

Ms Swift: That is correct.

The Chairman: Mrs Sullivan, did you have a question?

Mrs Sullivan: What I wanted to query was the second paragraph from the bottom on page 3, your explanation. Basically, are you saying that all that is changing here is process, that the board of negotiation is replacing the board of valuation for these kinds of disputes, and that the Expropriations Act still applies to property encroachments? I do not know the proper word, but as an easement.

Ms Swift: Essentially that is true. The Expropriations Act applies in the case of the Power Corporation Act where there has been an expropriation or injurious affection. It will now, under Bill 204, also apply in the case where the compensation scheme would be triggered. There has just been a sort of changeover from the board of valuation to the board of negotiation under the Expropriations Act. The procedure, I assume, would also change somewhat because it would comply with the Expropriations Act. You are incorporating the Expropriations Act, if you will, into there.

Mrs Sullivan: Do you know anything about the procedure under the Expropriations Act? Is it comparable to the board of valuation?

Ms Swift: I am sorry; I do not know. That was not a matter I looked into.

Mrs Sullivan: I am just wondering if it would make it any more difficult or any easier if things are—I know nothing about either one.

Ms Swift: I do not know.

Mr M. C. Ray: You mentioned injurious affection. Are you saying the entitlement of the affected land owner for injurious affection is either a claim under the Power Corporation Act or alternatively under the Expropriations Act, or are we merely talking about how the claim is going to be heard, the process?

Ms Swift: Let me clarify what I said previously. I think the Expropriations Act and the claim that a land owner might have under the Expropriations Act is for the initial acquisition of the property, on the one hand. Let's just look at that, isolate that. In that case, the owner says: "You're taking my land. I want to be paid for it." The mechanism to determine the amount to be paid is under the Expropriations Act.

Similarly, with injurious affection, it is defined under the Expropriations Act, as I understand it, to refer to the diminution in value to the residual property. For example, if Hydro wants to take a piece at the back of your business where your parking lot is or where your factory is

and then you cannot operate your business any longer, obviously the value of the property that is left over, that it did not take, is diminished. You cannot use it any more.

Those two deal with the initial acquisition of the property. Under Bill 204, the determination of compensation for a claim for property damage will now be determined by the board of negotiation under the Expropriations Act as if the claim were for injurious affection.

The Chairman: Mr Charlton, Ms Swift has to leave in two or three minutes.

Mr Charlton: Yes, I know. I will be very brief. Just so that I know I am understanding you correctly in terms of those things that are covered under these sections and those things that are not, clearly if, as a result of an easement and the installation of Hydro equipment on that easement, there was a need to remove a tree, for example, the compensation would be based on some kind of economic view of that tree and perhaps a replacement tree, as opposed to questions like loss of enjoyment.

Ms Swift: Yes, that is correct. It is damage to property only.

Mr McGuigan: Would it not be safe to say the Expropriations Act, because it is used constantly in many, many fields and is in the public domain far more than the Power Corporation Act is, would offer more protection to the citizens than the Power Corporation Act?

Ms Swift: I am sorry, sir. I could not answer that. I really do not know enough about the Expropriations Act and the mechanism of its workings to be able to answer that.

The Chairman: Members of the committee, you have also been handed a summary of Bill 204 from the research service. Lewis, did you have any comments at all that you wanted to make on this?

1420

Mr Yeager: I would just like to briefly describe the format we used in putting together this summary. If you would turn to the table of contents, you will see that because of the nature of the submissions and the relatively rapid time period we are using to work on this bill, some of the submissions related directly to sections of Bill 204 itself. Many others referred to sections of the Power Corporation Act without specific reference to Bill 204. They were either additional changes that were proposed or the presenters did not choose to mesh them with a section of the proposed Bill 204. Finally, there were additional matters that were discussed that may or may not

be directly related to the points covered in Bill 204 but are other energy-related matters.

I would just like to point out that in the first major section, which is called "Submissions Relating Directly to Bill 204," all the section numbers there relate to the sections of Bill 204. In the discussion it will cite in each case which section of the Power Corporation Act those refer to.

In the next chapter, which is called "Other Proposed Amendments to the Power Corporation Act," the section numbers there relate to the Power Corporation Act itself as it exists and they have the short form PCA after the section numbers.

It is just to assist the committee members in keeping the various section numbers separated. During clause-by-clause, for example, if you were looking at a particular section of Bill 204, you might want to cross-reference it. If section 12 refers to section 30 of the Power Corporation Act, a quick check with the following chapter—"Is section 30 referred to?"—would be useful just to tie all the odds and ends together.

Other than that, it is a straightforward summary. As usual, we have tried to give as broad a coverage of opinions as possible, but it is a digest and there may be one or two things that struck people as being essential that we have missed. We would be happy to upgrade the summary if these can be pointed out to us.

The Chairman: Are there any questions of Lewis? Okay; I guess that brings us to the main event?

Section 1:

The Chairman: Mr Lipsett, did you have any comments you might want to make about these sections as we get into them? I should add, please do not feel obligated to say anything.

Mr Lipsett: From time to time, if there is something we can add, I will. I believe the definitions are fairly straightforward and clarify a couple of positions in the bill.

Section 1 agreed to.

Section 2:

Mr Lipsett: Basically, it defines the composition of the new proposed board.

Section 2 agreed to.

Section 3:

Mr Lipsett: I think it is very self-explanatory. It defines the meeting times of the board. It was not as clear in the former bill.

Section 3 agreed to.

Section 4:

Mr Lipsett: This allows for the formation of committees as would be seen fit by Ontario Hydro.

Section 4 agreed to.

Section 5:

Mr Lipsett: Section 5 is to be repealed to provide for variance of either a part-time or a full-time chairman.

Mr Charlton: I think that in subsection 7, it should take into account the cost and environmental impact of these telephone meetings.

The Chairman: I appreciate that interjection.

Mrs Sullivan: An interesting view.

The Chairman: How about the environmental impact of having to move to the meeting rather than—never mind; we will not get into that.

Section 5 agreed to.

Section 6:

Mr Lipsett: This is basically remuneration for the board.

Section 6 agreed to.

Section 7:

Mr Lipsett: This section changes somewhat. Where before the only thing that was necessary was for the corporation to file an annual report with the minister, this makes provision for such other reports and information as the minister or the Treasurer would require from time to time.

Section 7 agreed to.

Section 8:

Mr Charlton: I have two amendments to the new section 9a proposed in section 8 of the bill and I have dealt with them separately.

The Chairman: Do you want to move them together perhaps?

Mr Charlton: No. I intentionally separated them because they deal with significantly different matters. It was also my hope that one might be considered somewhat differently from the other since I had a suspicion what the government's position would be on the first.

The Chairman: Mr Charlton moves that the proposed subsections 9a(1), (2) and (3) of the act, as set out in section 8 of the bill, be amended by adding thereto the following changes: in subsection 1, in the second line, delete the word "statements" and replace it with the word "directives"; in subsection 2, in the second line, delete the words "respect any policy statement" and replace them with the words "comply with any policy directive"; and in subsection 3, in the

second and third lines, delete the words "broadly conforms to any policy statement" and replace them with the words "complies with any policy directive" and, in the last line, delete the word "statement" and replace it with the word "directive."

Just before we move on, to get it straight in my mind, you have moved amendments now to subsections 1, 2 and 3 of the new section 9a. Would your second proposed amendment also add to subsection 1?

Mr Charlton: Yes.

The Chairman: You do not want to move it at this time?

Mr Charlton: No, all we will be voting on at this time are the amendments that I have just moved. When they are passed or defeated, I can still move the other.

The Chairman: So you want to deal with this amendment and then, depending on what happens, deal with your second amendment?

Mr Charlton: No, I will move the other one. I just do not want them voted on together.

Mrs Sullivan: He wants to have a second kick at the can.

Mr Charlton: It is on a different issue, though, so it is not a second kick at the can. I just do not want it defeated inadvertently.

Mr McGuigan: You would not vote on two amendments in one vote.

Mr Charlton: If I moved them all as one amendment to subsection 1, you would.

The Chairman: We will proceed then. Did you have any opening comments on your amendment?

Mr Charlton: Yes.

The Chairman: Would it be useful at this time to have Mr Lipsett give us any comment on section 9 in the first place? We just want to test to make sure that he is up to snuff on his parliamentary assistantship.

Mr Lipsett: Basically this is one of the key aspects to the new bill. These are all new provisions in the bill as to policy statements the minister will give that will have a bearing on what Ontario Hydro may do and the responsiveness of Ontario Hydro to the ministry.

1430

Mr Charlton: My amendments are about two things basically. The parliamentary assistant is correct, that this is one of the very important changes that is being made to the Power Corporation Act along with section 9b of the

same section of this bill. My amendments are an effort to try to make these changes as effective as we can possibly make them.

I refer back to my discussion with the minister this morning. I understand her comments, I suppose reflecting the concern in the ministry that there be some flexibility in the relationship with Hydro around questions of policy. I understand that, and my view is twofold: that the minister and the ministry can and always will be in a position to word their policy directives, statements, whatever else they might be called in a fashion to reflect that when flexibility is required; but when the government wants specific performance, the present wording of section 9a does not demand it.

You will notice—I am going to point this out to you, because it is not part of my amendment—that in subsection 9a(3), which is proposed in section 8 of the bill, the section now reads: “In exercising a power or duty under this act, the board shall use its best efforts to ensure that such exercise” and onward. My amendment starts after that part. I left in the words “use its best efforts” to try to reflect, I think, what the minister was trying to get at this morning.

In my view, what that section with my amendments does is ask or demand that Hydro attempt to comply with the policy directive of the ministry using its best efforts, and presumably if it fails, it is going to have to justify the failure, but it leaves those words in and adds to that the thought that I gave you just a few moments ago that no matter how tough the words are, the ministry is always in a position to word its policy directives in such a fashion as to reflect the circumstance that the policy is dealing with.

In other words, if the ministry believes that something may be possible but is not sure whether it really can be accomplished, then the policy directive can be constructed to deal with that concern, so that in any circumstance where the ministry sees a need for maximum flexibility, it can write that maximum flexibility into the policy directive itself. But on other occasions, when the ministry wants to demand a specific performance on the part of Hydro, it should have the authority to do that and demand compliance the same as it does in the next whole section, which is the section dealing with the memorandum of understanding.

The essential purpose of my amendments here is to make the intention clear, to make the purpose of this section clear to government, to Hydro and to those outside of those two circles who read this section, so that the expectation is

clear. The words that are there now, “broadly conforms to,” and other words like that in fact have no meaning. They do not set out in clear terms a real expectation. I do not know what “broadly conforms to” means and neither does the minister. I am not sure that anybody could define accurately for you those kinds of words.

All of those words, though, that are intended to accommodate are possible even in the kind of stricter wording that I have proposed here, and I do not want you to consider these amendments without fully understanding that the flexibility to which the minister referred this morning is still possible even with the kind of firmer wording that gives a clearer indication of an expectation that the ministry always will be able to deal with that question of flexibility in the way that it worded the specific directives itself.

On that basis, I would like to ask the members of the committee to support the amendments I have proposed.

Mr McGuigan: I have two points, I guess. One is on philosophy.

Mr Charlton: The last one?

Mr McGuigan: The first one is on philosophy. The point that comes to my mind is that if we are going to use directives—I wish I had a dictionary here. Perhaps we should get a dictionary. But just from my understanding of the word “directives,” you really put Hydro in the government’s hands. If we were going to follow that line, we might as well make it a government department rather than have a Power Corporation Act, and have a Hydro board.

On the latter point, I think the member defeats his own argument when he says that the flexibility can be taken care of with a policy statement. You would have to think about that a minute, but it strikes me that a stronger policy statement that the government can make is putting the onus on Hydro within that envelope of flexibility, to try to carry that out rather than reversing that and having the word “directive” and then a softer policy statement. I do not disagree with where you are heading, but I think that route takes you more away from your goal than it does towards your goal.

Mrs Sullivan: I appreciate where Mr Charlton is coming from on his resolution. I think where I see problems with the resolution relates to the role of the policy statement in section 9a and the directives in section 9b. I think they are fundamentally different things.

Under section 9a, the policy statements would tend, it seems to me—in lots of ways we are simply talking process here—the policy state-

ments could be very broad, such as, "Hydro will respect the concept of conservation." I am being very simplistic here, but where the directive would come in is under section 9b with specific directions and policy determination that is an instruction by government to Hydro through the memorandum of understanding.

Under section 9a, there would certainly be flexibility for the board to determine its own operational procedures and so on and reporting mechanisms that would enable the government to have an indication of what steps have been taken in respecting that policy statement, but indeed the reporting function and the actual compliance come in a different area.

So the government has a second kick at the can, as I just mentioned about your resolution. The first is the broader statement and the second is a very direct direction about the conduct of the business. In fact, it becomes almost more of an operational direction in many ways than the first. I was thinking of the sort of things you would look at in terms of other areas. If you are a parent and you say to your child, "You must respect adults," that is more of a broad policy statement than what occurs when your child does not respect the adults and later on you say, "Child, you must never, ever speak in that manner again and forthwith you must perform in this way." In many ways it is the same kind of situation. One is very broad and the other is quite specific. I think that is sections 9a and 9b of that bill.

1440

Mr Charlton: I would like to respond to both of the speakers, because they both made good points. On the other hand, I think they have also missed good points. I understand Mrs Sullivan and her comments very clearly. If you look carefully at subsection 9b(1), where we are setting up this process of the memorandum of understanding, it says, "Within six months after the coming into force of this section and at least once in every three years thereafter, the corporation and the minister shall enter into a memorandum of understanding."

Once the memorandum of understanding is signed initially and subsequently at three-year intervals or slightly less in terms of the interval, that is fine. You have the two parties, the ministry and Hydro, sitting down and negotiating and coming to some agreement around a memorandum of understanding which they sign, which then becomes binding in effect.

What you have in section 9a is sort of the governing process between conventions, if you like. Mrs Sullivan is right: Sometimes policy

statements, policy directives, whatever they are, are going to be very general in nature. It may be the kind of policy comment that we heard the former minister make before the select committee last fall when he made his presentation, when he was very vague but clear in terms of at least a direction. In his view, he was disappointed that Hydro's numbers of potential megawatts from conservation and parallel generation were not higher, and he felt there had to be renewed efforts to get them higher.

A policy statement may be, in the initial instance, that vague. On the other hand, we all understand the importance of what happens over the course of the next few very short years. For example, you start out with a vague policy statement like, "We have to have more conservation," or whatever the vague policy statement happens to be, but then the government decides to run a couple of the test programs that were referred to by the minister and others before this committee.

They document in clear terms in a couple of sectors precisely what is realistic at what cost, how long it takes, what the availability of that technology is out there. They have done their test program, they have all the i's dotted and the t's crossed and they want to get that implemented quickly, not three years down the road when they have negotiated the next memorandum of understanding, but perhaps in the next six to eight months for a particular purpose, to avoid a particular outcome.

The amendments I have proposed to section 9a give them the ability to do that: to be hard and tough when they have proven to themselves that a certain thing is possible, regardless of what the discussions between themselves and Hydro have been in the past. They now have the ability, through policy directives, to take a new and much more specific initiative. It, or some variation of it, or some extension of it, may eventually end up as part of the memorandum of understanding at some point down the road, but you then have an ability to move quickly and to be sure that there is going to be compliance with your direction. That is what this amendment is all about. It is not trying to rip away the possibility of the much vaguer, set-a-general-direction kind of policy statements that we know will also be part of the process.

The amendments I am moving still leave all the discretion about how this process will work with the government and the ministry. These amendments do not give me some magic ability as a member of the opposition party to screw up

the process for you. The control will still be in the hands of the minister, the ministry and Hydro in this process. There is not something magic in here that you are not seeing that is going to give me the power to give everybody headaches.

I go back to what the member for Essex-Kent (Mr McGuigan) raised in his comments. What he said is essentially and potentially true. On the other hand, it can work precisely the opposite way as well. The choices are still with the government and with the ministry, even having made the wording changes I have suggested. What it does not do, though, is leave you in the situation where you have decided, because of a test program you have done, that something is 99 per cent on and you have to go for the 99 per cent, and find yourself in the legal bind of not being able to enforce that because of the wording in section 9a as it now is.

No matter what our views of the real potential for conservation or the real potential for parallel generation or cogeneration and regardless of those differences between the member's view and my view, we will both be kicking ourselves in the behind if we miss something that is real and proven because of some weakness in the legislation, will we not?

Mr McGuigan: Can I respond? I do not think our views are very much different. The only difference between them is what is the best course of action. Given what we know about human behaviour, it seems to me we would want the minister to be the leader in making a strong statement—

Mr Charlton: That is what I am doing.

Mr McGuigan: —and not have to say to herself or himself, whoever that person might be, "What sort of tool am I going to put in the hands of the opposition when I make this statement?" I think the minister should be in a position to make a strong statement, be the leader and still allow the flexibility for Hydro and the minister or any other opposition person who will exercise his or her duty to point out shortcomings.

Mr Charlton: Any way we approach those questions, that is going to be the outcome. If the policy statements coming out of the minister are too weak, then the opposition is going to criticize them; if the policy statements coming out of the minister are good and strong but Hydro fails to perform, and she has no way of enforcing them because the act is weak, then we are going to criticize the minister too.

We want the Ministry of Energy to provide leadership. That is what these amendments are about. At the same time we want to give the

ministry the clout to accomplish the implementation of the strong statements it makes. As I said to you before, I left in the words "use its best efforts to ensure," because from time to time there are going to be reasons why a Hydro program fails. For example, the government goes out and does a test program on the capital installation of fridges for conservation purposes across the province and finds out what it is capable of saving per unit, so it goes out and tells Hydro to install four million fridges over the next five years, but Hydro can buy only 2.5 million because that is all the capital stock that exists. Those kinds of things are going to happen and reasonable people will have to deal with that and so I have left those words in.

Let's try to maximize the potential for performance and enforcement here. The minister still will have the discretion to decide when he or she—in the present case, she—is going to be heavy-handed in terms of questions of enforcement or directive. We all have heard the caution around all the questions of conservation and parallel generation and everything else coming out of almost everybody on the government side. That caution is going to get reflected in whatever they try to get Hydro to do unless and until they are absolutely sure, and hopefully that is when they are going to step harder and push harder, when they are sure that a proven program will work. But the discretion in terms of what the program will be and what the directive will say is still in the hands of the ministry and of nobody else.

They are the ones who are going to make the decisions about the directives they issue, so any binds they get themselves into will be the same as the binds they get themselves into now, of their own making.

1450

The Chairman: Shall the amendment to proposed section 9a carry?

Motion negatived.

Mr Charlton: My second amendment is to the same section, section 8 of the bill, the proposed subsection 9a(1). This amendment proposes to add the following words to the end of that subsection 9a(1). You will notice that in the first line I have put in both words. You can cross out the one we just defeated and read the amendment, "All such policy statements shall take into account environmental impacts and associated environmental costs and shall direct the corporation accordingly."

The Chairman: Mr Charlton moves that the proposed subsection 9a(1) of the act, as set out in

section 8 of the bill, be further amended by adding thereto the following, at the end,

"9a(1) All such policy statements shall take into account environmental impacts and associated environmental costs and shall direct the corporation accordingly."

Mr Charlton: There are those who will say—and we will likely hear the argument here this afternoon—that this government is committed to the environment, and I am not going to get into an argument about that issue. This is a piece of legislation that on the one hand is being proposed by this government and on the other hand may be administered far into the future by any number of different governments. So let's not talk about what this government's commitment to the environment is.

Let's talk about the environment from the perspective that the more often we remind people to take it into account in their planning process, to take it into account when they are designing a plant, to take it into account when they are doing this, that or anything else, the more often it is said, the more often it is there in front of people, the more likely we are to eventually get to a stage where it becomes a natural part of our process of planning, thinking and evaluating any number of particular proposals or any range of options of proposals.

I think we are all well aware that to the greatest extent, many of the environmental problems we have, we have because we did not know the consequences of certain processes when they were established in our industrial or power generation sectors or any number of other initiatives that have happened. On the other hand, there are also a lot of environmental problems that could have been avoided if they had been dealt with up front in the planning process rather than after we identified the problem. I think, for example, of all the known toxic chemicals we have used in our industry, ones that we knew were toxic before we used them in industry and yet we put nothing in place in the industry to deal with them in the process, nor did we require some kind of proof of ability for safe disposal before we allowed them to be used, those kinds of things.

Unfortunately, the best sections of the Power Corporation Act that have dealt with questions of the environment, environmental costs and environmental impact are not before us, and that precludes this committee from making amendments to those sections of the Power Corporation Act where they would be most appropriately set out. We saw some of those sections in the

presentations we had last week. I think it was Lewis Yeager who made the comment, when he was giving you the summary of their summary, Jerry Richmond's and his summary, that some of the presentations dealt specifically with sections of Bill 204, some other presentations dealt with issues that are contained in the Power Corporation Act but not part of Bill 204, and so on and so forth.

Like I have said, the best sections to deal with the environmental questions in the Power Corporation Act are not before us, but we have this one section, a new section, 9a, in which the government is going to be issuing policy statements that hopefully will give some direction to Hydro. I guess what this amendment is asking is that in every one of those policy statements, first of all, the ministry and the government consider the questions of environmental impact and the associated costs, but that the directive, the statement, whatever, to Hydro make specific reference to those issues, just as a constant reminder.

Mrs Sullivan: Once again, we have had, through these hearings as well as through our hearings last summer, a lot of input into this area relating to the calculation of environmental costs and impacts and so on into the planning and strategic development process.

I appreciate the sentiment of this amendment. Frankly, I do not believe it fits here. Policy statements under section 9a will not necessarily always relate to issues where there will indeed be an environmental cost or effect. The Power Corporation Act covers many areas, including the makeup of the board, including the activities of the board. It includes financial matters and it includes areas of relationship between the provincial Treasury and Hydro. It includes matters relating to the authority of Hydro over the municipal corporations, etc., etc. The government could conceivably, through the Minister of Energy, issue policy statements in any one of those areas from time to time and still meet the terms of the Power Corporation Act in doing that.

This amendment, therefore, that says all such policy directives must take into account environmental impacts and costs, frankly, does not fit.

Mr Charlton: What if there are none?

Mrs Sullivan: It does not fit.

Mr Charlton: All the section requires you to do is to say to yourself when you are writing the directive, "Does this have any environmental impact?" If the answer is "No, it does not," so there are no associated costs, it is complied with.

Mrs Sullivan: It does not fit and it is irrelevant in this case. I am not saying it is irrelevant in other places.

Mr Charlton: I said at the outset that I thought there were other sections of the Power Corporation Act that might better reflect our concerns about the environment. I think that is probably the case.

Having said that, I find the kind of argument you are making here a backward one. Sure, there are going to be lots of policy directives that are issued by the ministry that are directives to the board about any number of things. It may be a directive to the board or whatever about how it relates to the public in their consultation process.

I understand that, and if there is no environmental impact associated with the statement that the ministry is going to send to Hydro, then there is no problem. As long as somebody has asked himself, "Is there any environmental impact associated with this?" If there is, "What are the costs associated with that?" And if there is not, there is no problem.

What we want is a requirement. You can say the same, theoretically at least, about industrial proposals out there. Hydro might argue that there are no environmental impacts from the construction of the next nuclear plant. What we want to see, wherever we can get it in, though, is a requirement that at least that thought process occurs. Is there an environmental impact? If there is, take it into account, look at the associated costs, and if there is not, that is fine. At least you have considered the question.

1500

Mr Lipsett: I appreciate what the member for Hamilton Mountain (Mr Charlton) has to say, too, but I tend to concur with the member for Hamilton Centre (Mrs Sullivan). I believe this section is an expectation by us of Ontario Hydro to be a responsive corporate body using all the principles of economic liability and also to be a good corporate citizen.

Concerning the public expectation of the day of a good corporate citizen, environment is certainly of the areas of many, that we would expect to be included in such considerations, but to single out environment alone I do not believe is appropriate at this point in time.

To reiterate what the minister said this morning: If indeed it is necessary in the future, we can consider further amendments at that time.

Mr Charlton: I can tell that you guys have not read the latest polls. That is all.

Mrs Sullivan: We already have a policy statement, you know that.

Mr Charlton: That is it, put your hand up. You started it.

The Chairman: Shall the proposed section 9a, as amended, carry? All those in favour?

Those opposed?

Motion negatived.

Section 8 agreed to.

Section 9:

Mr Lipsett: This is basically a housekeeping amendment on the pension fund that is referred to in the act.

Section 9 agreed to.

Section 10:

Mr Lipsett: This is a new clause that has been added. I think it is basically self-explanatory. In other words, I am not sure.

The Chairman: You were doing okay until the last three words.

Section 10 agreed to.

Section 11:

Mr Lipsett: This is another new paragraph that has been added to amend section 19 of the act to list the securities and other assets which the corporation may invest in.

Section 11 agreed to.

Section 12:

Mr Lipsett: Section 12 is a change of wording to delete the requirement of the Lieutenant Governor's approval in certain instances and also addresses the concept of the implementation of other pension plans.

The Chairman: Mr Charlton, you have an amendment to move to proposed section 27. Shall we deal with the first three subsections to section 12 first? Shall subsections 12(1), (2) and (3) carry? Carried.

Mr Charlton: I am not sure my amendment is worded exactly as it should be in terms of the "I move" part, because I notice there are—No, I guess that is okay because the next one is subsection 12(7a). It probably is all right.

The Chairman: Mr Charlton moves that subsection 20(7) of the act as set out in subsection 12(4) of the bill be further amended by adding thereto at the end:

"If the establishment of any other pension plan would result in any alteration to the Ontario Hydro pension and insurance plan, the proposal shall be subject to negotiation with the union."

Mr Charlton: You will recall the presentation from CUPE Local 1000. I think they made it fairly clear in their presentation that they had no objection to this section or to its intent to allow

Hydro to set up other pension plans. Their only concern was any impact in that process that would result on the one existing pension plan that involves everybody.

I think their concern is a legitimate concern, whether in legal terms it is real or not. That is something that I cannot answer, unfortunately, not having access, in the short time since their presentation, to all of the other relevant documents: the collective agreement, the pension plan itself, the trust agreement and so on. But it seems to me that this kind of simple protection in the act itself, where we are allowing for the creation of the new plans, just to say, "If the establishment of any other pension plan would result in any alteration in the Ontario Hydro pension insurance plan, the proposal shall be subject to negotiation," provides that intended protection.

Mr Lipsett: Maybe it would be helpful for Mr Charlton if—

Mr Charlton: I am not wedded to the wording. Certainly it is the idea that I am wedded to—

Mr Lipsett: The concept?

Mr Charlton: Yes.

Mr Lipsett: I had Ed Ciemiega, the director of legal services with the ministry, contact Art Gardner, deputy general counsel and assistant secretary to Ontario Hydro, and he suggests, in his opinion, that the creation of a new plan would be subject to the terms of the collective agreement that is in place with the union. In other words, before there could be any changes made to the pension plan, the agreement of the union is necessary.

Mr Charlton: I think that is the feeling of the union as well. I think the question was one of some uncertainty and I am proposing the amendment not from the perspective of being sure that there is a problem. I like to take the view that I would rather be sure that there is not than unsure that there is. That is the basis on which I am proposing the amendment.

I am not sure that there is in fact a problem because, as I said, I have not seen all the other documents, so I do not know what they say. The union in its presentation was not sure either in legal terms. This amendment that I have proposed, as I read it, if what you tell us is true, does not impose anything new and, if this opinion you have received happens to be an incorrect opinion, then this section simply would impose what we believe is now true that turned out not to be.

The Chairman: Any further discussions?

Mr Charlton: In other words, what you have is a legal opinion. We do not have a clear written understanding on that, and that is why the union raised its concern here. They felt the employer would have to negotiate changes with them, but when you have a new piece of legislation, nobody is necessarily always sure. That is what this amendment is about. I do not know whether there is in fact a real problem out there, but I would rather be sure that there is not by eliminating it with an amendment than be unsure that there is and find out six months down the road that we were wrong and there is a problem.

Mrs Sullivan: I was trying to find the Local 1000 brief. It seemed to me that in their presentation they felt that there had been substantial negotiation and discussion with them relating to the changes that have been proposed for the act.

Mr Charlton: "And part of the problem resolved." Those were exactly the words they used.

Mrs Sullivan: That is right. As well, I did not have the impression from them that they were suggesting that changes needed to be made to the act to ensure that the current agreement covered changes.

Mr Charlton: This amendment comes specifically as a result of a question I raised with them and their answer to my question.

Mrs Sullivan: I understand that. However, I think their point was more that they wanted to underline, as much for Ontario Hydro as for this committee, the need to continue mutually to determine what changes to the collective agreement would be required to make changes to the pension plan and possibly to introduce new plans. Certainly what they were underlining was the need for mutual consent. My interpretation was indeed that they were, in repeating the need for mutual consent, conducting some of the negotiating at this table. I thought it was a useful intervention, but I do not think that we need to change the bill.

1510

Mr Charlton: Just as a wrapup comment, I would refer you specifically—because I do not have the Hansard of the response to my question—to their printed presentation. The pages are not numbered, so at the bottom of the page where pensions are the issue, two thirds of the way down, it says, "The initial concern that Hydro might try to sidestep our right to negotiate pension issues by claiming that a removal of the need for an order in council effectively removed

our negotiating rights has been partially addressed."

I went back to that comment in their presentation in my questioning of them and their response was simply that they were not sure in legal terms what the passage of this section as it now reads implied and that they would like some kind of assurance that there would be no impingement.

I am not here to try to negotiate CUPE Local 1000's problems with Hydro away or to negotiate its next pension improvements or anything else. The amendment does not deal with any of those questions. Mrs Sullivan may be right: This amendment to the act may be unnecessary, and that the parliamentary assistant's comments when he told us about having got a legal opinion as to what would happen as the act now stands—we all know what legal opinions are. Legal opinions are things you get from lawyers when you ask them a legal question. Sometimes they are the same legal opinions from two or three and sometimes you get two or three different opinions from two or three lawyers on asking them the same question. That is what a legal opinion is.

All that this amendment does, in my view, is ensure that what we have been told people believe will be the case will in fact be the case. It just answers the question.

Mr Lipsett: Mr Chairman, I wonder if it would be helpful if I asked Ed Ciemiega to come forward and provide us with a little more insight, with the approval of the committee.

The Chairman: I do not see any objections. Why not just take a seat at the back, Mr Ciemiega? I believe you are already known to Hansard.

Mr Lipsett: We want some clarification on the interpretation of the concerns of the unions when they were before us.

Mr Ciemiega: My understanding is that the union was concerned because in the collective agreement there was reference made to regulations. The agreement says in effect that if there is to be any change to the regulations, the union has to concur with such change.

Because of the amendment that we are proposing in the act, changing the word "regulations" to "rules"—and the reason for that I will explain in a minute—they wanted assurance from Ontario Hydro that the collective agreement would be amended to cover that change so that, instead of reading "before there are any changes to the regulations the union has to agree," it would read "before there any changes to the rules the union has to agree." It is my understanding

that the president of Ontario Hydro has given them that assurance and there was to be a letter to that effect. They may already have it.

The reason we are changing "regulations" to "rules" is as follows. Right now, all of the amendments to the pension agreement are the subject matter of collective bargaining. The pension agreement itself is subject to collective bargaining, and that is why we were taking out the reference to the Lieutenant Governor in Council approval, because it made no sense for the Lieutenant Governor in Council to try to override something that had come up as a result of collective bargaining between the union and Ontario Hydro. It was just an exercise in futility in effect.

In deleting the reference to Lieutenant Governor in Council approval, we had to change the word "regulations" where it appears in section 20 because the act defines a regulation as something made by the Lieutenant Governor in Council, so we had to come up with a different word and we have used the word "rules."

My understanding is that if that letter has gone forward and they are happy and—

Mr Charlton: What you have just described for us is the part of their concern which they feel has been resolved. I refer you again to the words they use: "partially address." Those questions have been addressed and they are no longer concerned about those questions. The questions which they are concerned about deal with the creation of new plans specifically, the impact of lost members on their own plan, the way that moneys coming out of the existing plan to go into a new plan would be flowed, at what rate, and a number of other issues along those lines. They have nothing to do with the things they have already been satisfied about.

I had a fairly lengthy discussion with them after the hearing outside, but the discussion resulted from the specific question which I asked them after their presentation. I think the wording in my amendment reflects the response that they gave to me about what their outstanding concern was. Their concern is technical in nature around contributions versus entitlements, if plan funds are to be divided to put funds into a new plan, and a number of other issues like that.

They want to ensure—and it may be there already, like I said. This amendment is an amendment intended to ensure that under no circumstances can anything happen to the existing fund without negotiating it with them. That may already be the case. If it is already the case, adding this does not hurt anybody; it does not

change that. If it is not already the case, then it imposes that.

Mr Ciemiega: I am not sure what this particular clause does. If it could be interpreted to mean that before Hydro does in fact establish another plan, the terms of that other plan are also subject to negotiation with the union, if that is the interpretation—

Mr Charlton: Like I said at the outset, I am not wedded to this wording. If there are legal problems with the words that I have proposed and we can make them more specific to cover their concerns—because the intention is not to have them negotiate the terms of another plan that may be strictly a management plan. The amendment is intended to ensure that anything that happens to the existing plan is negotiated with them.

Mr Ciemiega: All I can say to that is that the associate general counsel assures me that under the terms of the collective agreement any change to the existing plan requires their agreement.

Mr Charlton: Then why can we not say that?

Mrs Sullivan: I think we are in a funny kind of debate here about two things in a way. Counsel has provided us with information indicating that the current collective agreement relating to the existing plan and changes that would be made in it would not cause a change, in that discussions would take place, negotiating would continue and the collective bargaining process would go on.

I think we have to remember that Hydro's plan is a defined benefit plan. Therefore, even if new plans were formed—say the management category was going to have a new kind of a plan—that would not affect the existing plan for members other than those in the management category who are in the existing plan because it is a defined-benefit plan. It is based on length of service. It is based on income. In many ways, those things are already part of that collective agreement.

1520

Mr Charlton: They are not. That is the problem.

Mrs Sullivan: Indeed, the discussion would, as it affected people other than those who would be moved into a new plan—to my understanding, Hydro does not particularly have any advance plans for another plan, but it is an opportunity to have them if necessary. Any change to the existing benefits for people who are in the plan would definitely be part of the collective agreement and of that bargaining. That is very much set out in the current collective agreement.

The union talks about its being included in section 17 of that collective agreement.

Mr Charlton: Like I said, I had a very lengthy discussion with them out in the hall and their view is that it is not that clearly set out in the collective agreement in terms of how funds that are now in the plan would be split if there were funds being flowed to a new plan on behalf of members who had gone to the new plan. You are saying to us, and everybody who has commented so far has said, that if there are any changes to the existing plan, they will have to be negotiated with the union. So why can we not say that? What are we afraid of?

Mr McGuigan: I do not think we should be passing labour law here.

Mr Charlton: That is what we are passing in the section the ministry proposed. If the word "pensions" had never been in here, the union would not have been in with the comment about pensions, would it?

Mr McGuigan: You are passing what is existing, but when you are putting this, you are putting an envelope around the labour laws. I think the place to do that is in labour law, not in the Power Corporation Act.

The Chairman: Any further comments? Shall the amendment to subsection 12(4) carry? All those in favour? All those opposed?

Motion negatived.

The Chairman: Shall subsection 4 as set out in the bill carry? Carried.

Section 12 agreed to.

Section 13:

Mr Lipsett: These are new regulations that would be in effect with the approval of the Lieutenant Governor to allow the corporation to prescribe additional powers and also for the Lieutenant Governor in Council to authorize the corporation to participate in specified economic development programs from time to time.

Section 13 agreed to.

Section 14:

Mr Lipsett: Section 14 has to do with expropriations, as we have discussed earlier today.

Section 14 agreed to.

Section 15:

Mr Lipsett: Section 15 deals with the same item and it includes the failure to give notice to claim under damage.

Section 15 agreed to.

Section 16:

Mr Lipsett: This deals with homes that have been purchased by employees who then have been transferred, if the employment of the corporation obliges the employee to reside in a new location.

Section 16 agreed to.

Section 17:

Mr Lipsett: I believe this is basically a housekeeping item. In fact, in the revision of this section the last time, the wording was incorrectly inserted.

Section 17 agreed to.

Section 18:

Mr Lipsett: Section 18 deals with an amendment to afford the same privilege relating to unregistered easements to municipal corporations and municipal commissions established under the Public Utilities Act which had been acquired works from the corporation.

Section 18 agreed to.

Section 19:

Mr Lipsett: This section has to do with increased fines for affixing signs to corporation property.

Section 19 agreed to.

Section 20:

Mr Lipsett: This section amends the act that authorizes the corporation to borrow moneys.

Section 20 agreed to.

Section 21:

Mr Lipsett: The purpose of this amendment is to authorize the Lieutenant Governor in Council to guarantee any premiums offered by the corporation as well as the principal and interest.

Section 21 agreed to.

Section 22:

Mr Lipsett: Section 22 amends subsection 55(2) of the act by adding discount notes to the list of securities that the corporation may pledge as security for temporary loans.

Section 22 agreed to.

Section 23:

Mr Lipsett: Section 23 in an amendment states that the corporation will have the following incidental powers subject to the Lieutenant Governor and lists those powers.

Section 23 agreed to.

Section 24:

Mr Lipsett: Section 24 amends section 56a, which states that one of the purposes of the

corporation is to provide energy conservation programs.

The Chairman: Any comments? Any amendments?

Mr Charlton: It is kind of late in the context of the amendments we defeated, but this section, for me, points to one of the things I was trying to address in one of the amendments I moved earlier where you get wording like this in legislation, "The shifting of electrical loads from times of high demand to times of lower demand."

For example, Hydro has proceeded to do a load-shifting program this year. I think you are all aware of the day-night shift. Hydro spent a number of years studying load shifting and the potential for being able to reduce the peak, or level the load through load shifting. What they decided to do in their program this year was to pursue the option that was least costly to Hydro, but unfortunately it was the least effective, in terms of their overall impact on total peak demand, of the two pursued in their study.

It is an issue we have left ourselves unable to get at because of the kind of vague words we put into legislation. This is not going to make any difference. It bothers me that we take this kind of approach, when we say out of one side of our mouths that we want the best we can get, but on the other hand we are prepared to pass legislation that allows less than the best to happen. It is something that I think we need to start dealing with in a much more precise and particular way, rather than turn our heads and say we are hoping for maximum co-operation. We want to see everything happen in the nicest and most friendly fashion we can. At the same time, we want to get as much as we can and we are not prepared, in a specific way, to go after it.

1530

This wording here is just a perfect example of that, "The shifting of electrical loads from times of high demand to times of lower demand." That is the kind of, yes, useful direction but vague statement that ends up causing us to find ourselves in the situation we found ourselves in this year with a program that could have been, in terms of peak demand, much more beneficial. Because Hydro had the authority to do it, it sawed it off and took the middle road, reduced the peak less than it could have because it did not impact on its revenues as much as the maximum potential would have.

It reflects on how so many of the groups that have come before us in these hearings, the hearings a year ago and the hearings back in 1986 have said repeatedly, and some of us even

chuckle from time to time when they say it because we somehow do not believe it, that the system is designed and the way Hydro operates is designed to ensure that we never achieve the maximums that are possible out there. That is in fact what we are doing and what the system itself is doing.

Section 24 agreed to.

Section 25:

Mr Lipsett: Section 25 authorizes the corporation to make loans related to energy conservation programs.

Section 25 agreed to.

Section 26:

Mr Lipsett: The purpose of this section is to include the encouragement of parallel generation as one of the purposes of the corporation.

Section 26 agreed to.

Section 27:

Mr Lipsett: This section gives the corporation the power to purchase and sell supplies and to lease as well.

Section 27 agreed to.

Section 28:

Mr Lipsett: The purpose of section 28 is to authorize the corporation, subject to the approval of the Lieutenant Governor in Council, to carry on related business ventures within and without Ontario, and for that purpose either to acquire or to cause the incorporation of business corporations.

Mr Charlton: Perhaps just a question in a second.

The Chairman: Does anyone else want to make any comment while Mr Charlton—

Mr Charlton: In subsection 27(1), section 57 in the act, which is what we are amending here: "The corporation may purchase or lease such electrical, hydraulic or other machinery, appliances, apparatus and furnishings as may be used in the transmission, distribution, supply or use of power and may sell or dispose of any such thing that it owns."

How is that controlled? What does that mean precisely in terms of what Hydro can sell and with whose authority? This section seems to imply that Hydro can sell any of its capital stock at will.

Mr McGuigan: An unused right of way?

Mr Morin-Strom: How about a hydro-electric plant or a nuclear power plant?

Mr McGuigan: Do you want to buy one?

Interjection: A lot of industries would.

The Chairman: Would it be helpful if one of the ministry staff came forward?

Mr Charlton: Yes.

Mr Lipsett: Maybe I can get Cliff Jutlah to come forward to help us with that explanation.

Mr Jutlah: As you know, one of the provisions of the act gives the corporation the power to dispose of surplus lands on terms and conditions as the corporation sees fit. This is merely an extension of that kind of provision.

Mr Charlton: There are two questions that flow out of that. Presumably, this section covers everything up to and including the nuclear plants.

Mr Jutlah: I do not think that is what it says here.

Mr Charlton: Why does it not say that here?

Mr Jutlah: It refers to "electrical, hydraulic or other machinery appliances, apparatus, furnishings." These are in the nature of supplies. They are not in the nature of an electric generating plant, for example.

Mr Morin-Strom: But there are two phrases. The first phrase says "may purchase or lease," and we have a big list of things you can purchase or lease. Then the second part of the phrase says "and may sell or dispose" and it is wide open, "of any such thing that it owns." That second part, "and may sell or dispose," does not refer back to a restrictive list such as with respect to purchasing or leasing but is wide open, which presumably includes hydroelectric generating facilities.

Mr Jutlah: I guess we can refer that to the legal experts, but I would have thought that "any such thing" was the operative expression there. It refers back to the items identified earlier.

The Chairman: Would it be helpful if legislative counsel commented? Maybe I am putting you on the spot.

Ms Baldwin: I would be happy to. I do not mind at all. I would agree with the remark Mr Jutlah just made. "Any such thing" is a reference back to the things that have been listed previously in the subsection. I do not think there would be a problem with that.

Mr Charlton: The other question that flows out of this is a question that relates back to the Municipal Electric Association and its—I do not know how to phrase this—part ownership of the assets of Hydro. Is there, in the purchase and disposal of assets, part of which theoretically somewhere in legislation they have ownership of—I think they refer to about 70 per cent of Hydro's assets. I do not know whether that is

accurate or not, but they do own some portion of the assets of Ontario Hydro. Is there no requirement for any kind of consultation or compensation upon the disposal of assets?

Mr Jutlah: As I understand the point that the representatives of the association were making in their presentation, what they were saying was that if you looked at the balance sheet for Ontario Hydro, you would find items listed such as liabilities and equity. What they were saying was that they have a claim to 70 per cent or thereabouts of the equity; not the total assets of the corporation, but a claim to about 70 per cent of the equity.

Mr Charlton: To the nondebt equity, yes, okay.

Mr Jutlah: Right. The corporation, of course, is a legal entity, and I do not think there is provision in the act for shareholders.

The Chairman: Mrs Sullivan, did you have a supplementary to that?

Mrs Sullivan: Yes. I wanted to refer Mr Charlton to subsection 57(7) of the current act where it says, "Any net profit obtained by the corporation...shall be applied as the corporation considers equitable towards reduction in the cost of power to municipal corporations having contracts with the corporation for the supply of electrical power." I think his point is covered in the existing act.

1540

Mr Charlton: I am not sure it was, but run that by me again.

Mrs Sullivan: "...shall be applied...towards reduction in the cost of power to municipal corporations having contracts with the corporation for the supply of electrical power." There is a direction really that is statutory to use the profits to reduce the cost of power. Municipal corporations are specifically named.

Mr Charlton: My concern was somewhat different in terms of the question I asked, but the question I asked had to do with consultation before the disposal of assets. The reason I raised the question had nothing to do with who gets the benefit at the end of the process; it has to do with the discussion we were having with the MEA people when they were here about municipal electric utilities that are already involved in generation and that may increasingly want to be involved in generation in the future, and whether or not they are getting the opportunity in an effective way to do that when Hydro is deciding to dispose of assets which are related to the topic of discussion, I assume.

Mrs Sullivan: Are you suggesting that they might want to buy them?

Mr Charlton: They may want to buy them or they may want to take over a facility Hydro is trying to unload.

Mrs Sullivan: Then I would not see anything that would limit them.

Mr Charlton: It was not a question of limiting them. I did not ask if this section limited them. I asked because this section says the corporation can do it, bang. I asked it because they have assets in the corporation, because they have equity in the corporation, because they own 70 per cent of the equity in the corporation, whether there was any process of consultation before assets were disposed of. That is what I asked. I think that is what I asked, was it not?

The Chairman: If it was not, it ought to have been.

Mrs Sullivan: Say no.

The Chairman: If I could be helpful, presumably they have the same right that any other shareholder has, which is usually that they are not in any corporate structure—

Mr Charlton: They do not have any rights if they do not find out about it until after something is sold.

Mr Jutlah: There are no shareholders who are identified for the corporation.

Mr Charlton: That is right. They own part of the equity, but there are no shareholders. They do not get called to meetings. I just asked if there was any process of consultation before Hydro unloaded assets they might be interested in. That is what I want to know.

Mr Jutlah: As you know, one of the provisions of the act says that the business and affairs of the corporation are within the jurisdiction of the board of directors. This would be an operational matter which would come under the board's jurisdiction.

Mr Charlton: Here is a second letter we can send. Thank you.

Mr Matrundola: I am wondering whether Mr Charlton is worried about the disposition or acquisition of chattels or about the disposition and acquisition of land, because I heard about rights of way and things like that. What is it that worries you, Mr Charlton? It says here, "The corporation may purchase or lease such electrical, hydraulic or other machinery, appliances, apparatus and furnishings as may be used in the transmission, distribution, supply or use of power and may sell or dispose of any such thing

that it owns." Did I hear some reference to rights of way or land?

Mr Charlton: Not from me, you did not.

Mr Matrundola: So what is the concern?

Mr Charlton: My point and my question was that in their presentation to us last week there was reference by the Municipal Electric Association to the fact that some of its members were already involved in generating power on their own, that they saw an increasing role in that area in the future, in terms perhaps of both generation programs and conservation programs. During the questioning we got into an interesting discussion of some potentials in that area.

My question was simply asking, because this section sets out the corporation's sole authority to buy, lease and dispose of a number of items which are related to the whole process of generation and delivery of power—

Mr Matrundola: If you see the margin, in caps it says, "The corporation may purchase lease and sell supplies." This is the ultimate supplier with the supplies.

Mr Charlton: That is precisely what I am talking about.

Mr Matrundola: If they need more supplies, they have to buy it.

Mr Charlton: No, slow down. I did not ask him anything about their purchasing policy. I asked him whether or not there was any process of consultation with the municipal utilities before Hydro disposed of assets, not before it purchased them, before they disposed of assets.

Mr Matrundola: Is that not the normal course?

Mr Charlton: That is what I asked. Nobody seems to be able to answer me. That should be the normal course, but—

Mr Matrundola: I believe they usually do that anyway, without saying.

Mr Charlton: Well, I cannot hear anybody who is prepared to tell me that that is in fact the normal course.

Mrs Sullivan: You should take out a want ad in the classified section.

Mr McGuigan: I think what Mr Charlton is asking about, and it is certainly a good question, is the first right of refusal.

Mr Charlton: Yes, precisely.

Mr McGuigan: Under a good many ministries, and the one that comes to mind is transportation, when they are selling or disposing of used equipment, they have an auction sale widely advertised. I guess the question for all of us is, is there an act affecting or a clause affecting Hydro, directing it to use certain systems when it disposes of assets?

Mr Charlton: I think the answer over here was that that would be at the discretion of the board. I do not have any objection to that if in fact the board has a policy to do the consultation, but perhaps that is—

Mr McGuigan: Even in the absence of such a policy, I think that certainly you could accuse them of mismanagement if they did not widely advertise.

Mr Charlton: I would not want to do that, Jim, but if they are not doing it now, I would like to suggest that perhaps they consider it.

Mr McGuigan: I was just suggesting that they might want to think about it.

Mr Charlton: I would not want to accuse them of mismanagement.

The Chairman: Mr Brown, you have been anxious to say something.

Mr Brown: We are out of here. I am not that anxious.

The Chairman: All right. Section 28. Comments?

Mr Matrundola: The purpose of this section is—

Mrs Sullivan: We passed it.

Mr Charlton: Yes, we passed it, Mr Matrundola.

Mr Matrundola: What are we discussing then?

Mrs Sullivan: I wonder if this is an appropriate time to take a break now, because I suspect there might be some discussion on section 28, and come back tomorrow.

The Chairman: Is that a motion to adjourn?

Mrs Sullivan: I guess so, yes.

The Chairman: All those in favour? Shall the motion carry?

The committee adjourned at 1548.

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Staff:

Baldwin, Elizabeth, Legislative Counsel

Swift, Susan, Research Officer, Legislative Research Service

Yeager, Lewis, Research Officer, Legislative Research Service

Witnesses:

From the Ministry of Energy:

McLeod, Hon Lyn, Minister of Energy and Minister of Natural Resources (Fort William L)

Ciemiega, Edward, Director, Legal Services Branch

Jutlah, Cliff, Manager, Electricity, Liaison and Planning Branch



No. N-9

Hansard

Official Report of Debates

Legislative Assembly of Ontario

Select Committee on Energy

Power Corporation Amendment Act, 1989



Second Session, 34th Parliament

Wednesday 4 October 1989

Speaker: Honourable Hugh A. Edighoffer
Clerk of the House: Claude L. DesRosiers

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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Wednesday 4 October 1989

The committee met at 1021 in room 228.

POWER CORPORATION AMENDMENT ACT, 1989 (continued)

Consideration of Bill 204, An Act to amend the Power Corporation Act.

The Vice-Chairman: Good morning, committee members. I guess all parties are represented. The chairman, we are told, is stalled in traffic someplace, so we will begin. We are at section 28 in clause-by-clause.

Section 28:

Mr Lipsett: The new section authorizes the corporation, subject to the approval of the Lieutenant Governor, to carry on related business ventures within and without and outside Ontario, with certain restrictions.

The Vice-Chairman: Do you have any enlargement on what those restrictions are?

Mr Lipsett: Those restrictions are to deal with shares and stocks and securities and acquisitions.

The Vice-Chairman: Are there any comments?

Mr Cureatz: Section 28, which is dealing with section 59a; is that what we are doing?

Clerk of the Committee: That is correct.

Section 28 agreed to.

Section 29:

Mr Lipsett: Section 29 relates to amendments to section 62 of the bill that provide that the rate of interest to be paid by a municipal corporation to the Hydro corporation on any payment in arrears shall be a rate equal to the average short-term borrowing rate for funds borrowed by the corporation during the quarter preceding the date that the payment went into arrears.

Section 29 agreed to.

Section 30:

Mr Lipsett: Section 30 of the bill amends section 69 of the act, which authorizes the corporation to supply power to persons other than municipal corporations or parks boards only if the Lieutenant Governor in Council approval is obtained, and further goes on to ensure that power requirements of Canadians are met before those of foreign customers.

Mr Cureatz: Members of the committee will see that they have in front of them a motion, although it was so correctly pointed out to me by the clerk of the committee that it was not necessary to be put in such a manner because those of us who would be voting against a section would just speak and vote against it.

However, I wanted to bring it to all members' attention, and I brought it forward in this manner just to highlight it and again reiterate what we had discussed earlier, I guess it was yesterday, with the minister and what we had pointed out the week before.

In the interest of maybe waiting for some more Liberal members to come forward to ensure that the section passes—either that, or possibly my NDP colleagues will be supporting the Liberals. Or maybe the chairman can stand it down. Can you do that or not?

However, just to refresh my Liberal colleagues' memory, we feel that the section is strictly in terms of some cute politics for the present administration. Generally speaking, as supportive as we have been of the bill, we can remember with great interest when this area was highlighted with the former Minister of Energy, with a press release indicating electricity would not necessarily be sent across the border in the event, as the proposed section 30 to amend section 69 indicates, that there were indications that the electrical needs of the province would not be met and therefore no supply would continue on to the United States.

For practical purposes, as we discussed—I brought it to the members' attention earlier—for those of us who have had the opportunity of sitting on the committee for a good length of time and visiting the Richview switching station, which in my understanding, seeing Hydro officials here, there is a move to move the switching station? Yes? No? Nod? There is. What is the anticipated date of that?

Ms Robinson: They have begun to move some of these—

Mr Cureatz: To Clarkson? Is that going to be the major station?

The Vice-Chairman: Order, please. Would the person who answered the question come and identify herself.

Mr Cureatz: I am sorry.

Ms Robinson: My name is Linda Robinson of the government relations department of Ontario Hydro.

Mr Cureatz: While Linda is here—I am sure it is totally out of order, but I know how copacetic the chairman is, under the circumstances—will the switching station be similar to Richview in terms of what it is capable of doing?

Ms Robinson: Yes.

Mr Cureatz: Will there be any other diversions, larger, capable of doing other things?

Ms Robinson: More advanced technology.

Mr Cureatz: And in Clarkson, which is near, what, the Lakeview generating station?

Ms Robinson: Yes.

Mr Charlton: What we are talking about here is the system control centre?

Ms Robinson: Yes.

Mr Cureatz: It seems so odd. I mean, one would have thought that a more remote location might have been in order. I remember when we were visiting Richview that there was concern about the heavy air traffic, for instance, involved. If an accident ever happened in terms of an airplane colliding into a switching station, is Clarkson less remote? Not much.

Ms Robinson: I do not know that it is less remote, but there are security systems in place.

Mr Cureatz: Okay. Thank you, Linda. I appreciate that.

That was more for my information in terms of following the switching station progress than in regard to my concern for section 30; however, the same thing applies. No matter where the final switching station is going to be, for those of us who have visited there, it is quite a kaleidoscope of dials and monitors whereby the amount of electricity being produced in the province is tabulated instantaneously along with direct telephone correspondence to, as I recall, various corporate utilities in New York state. Decisions are made from moment to moment as to the amount of electricity that would be required from moment to moment in New York state or, vice versa, the amount of electricity that is required in Ontario.

I say that because although we would have the capacity to produce the required electricity, what often takes place is if our base-line load, for instance, being produced from a nuclear station is meeting our demands but suddenly we are running into an increase, it may not necessarily be cost-efficient to start up a coal-fired or

oil-fired station, calculating all that entails monetarily, as opposed to purchasing power from the United States.

The point of the matter is, and as it was relayed to me, that electricity knows no borders, that the electrons are flowing back and forth aided by human assistance at the various switching stations and it is not so easy to merely turn off the tap to Niagara Falls where the lines cross or down the St Lawrence River.

In any event, with that in mind, we in this caucus have concerns that the section was being promoted more for show than for substance. I know the minister reflected on the section when I made inquiries of her, and we obtained the response that her former colleague had reiterated to us both in letters personally and through questions in the House. With that in mind, we would look upon all members of the committee to give consideration to the practicalities of what the system is presently able to accomplish and what the section is purporting to say.

1030

There is a diverse situation in terms of what section 30, amending section 69, purports to do and what can practically be done. What the section wants to do, I feel very comfortable in saying, cannot be done in terms of the stoppage of electrical power across the borders. I mean, we could go into the various agreements that have already been entered into by the various utilities to have the kind of co-operation, if I recall, and I think it was called the northeast quadrant of the continent, for the flowing of electricity.

I am disappointed that the government is still pursuing the section, especially when you think of the fanfare of co-operation, with the Premier (Mr Peterson) visiting Washington last week, I guess, beating the drums about various issues and yet, by the same token, purporting to bring in a section that would eliminate electricity flowing to the United States. If he is down there talking about acid rain, and by some chance this section could be invoked so that suddenly there was a flow of electricity that was not as much as has been regularly depended on by the utilities in the United States, one would think that what would take place would be an increase in the coal-fired plants. That would then result in more acid rain, and I think that was why the Premier was down there, talking about acid rain.

I stress to the government members, as enlightened as you all are—and as in the scheme of things around here, I know it is difficult to use your good judgement—to evaluate what is actual-

ly taking place. I am sure they will agree with me that it cannot be taking place under this section. As a result, I will not be supporting this section.

Mr Charlton: I would like to start out with some questions, and we may need the assistance of some of the officials.

My understanding is that at present all that we sell is surplus capacity. Am I correct in that understanding?

Mr Lipsett: I am going to ask Cliff Jutlah to come forward. As he is doing so, let me say that I think our present provisions are basically on day-to-day and emergency-type situations. He might be able to enlighten us further on that area.

Mr Charlton: There are no firm contracts for export, and there are no facilities in Ontario being operated strictly for export of power. Am I correct?

Mr Jutlah: That is right. There are no facilities dedicated for exports. Ontario Hydro does have surplus power generating capability from time to time. For example, during the summer months the demands within the province are less than what the system is capable of producing. During the winter months, depending upon the extent of the load, we may need to buy power from neighbouring utilities.

Those arrangements for short-term sales are done through interconnection agreements which Ontario Hydro has with neighbouring utilities. As Mr Cureatz pointed out, by flicking the switch, you can get the flows of the power across boundaries.

As opposed to those short-term arrangements, one could think of firm contracts for the supply of power, which put an obligation on the part of one utility to buy and the other to sell. There are no such provisions right now. The purpose of this particular clause is to ensure that before Ontario Hydro negotiates any firm contracts for long-term sales of power, appropriate approvals would be obtained from the province and that the price would be above the domestic price.

Mr Charlton: Perhaps you are not in a position to answer this. Is it the government's intention that in the future we will be negotiating and signing firm export contracts for electricity in Ontario? Is that what the intention of this section is, as opposed to dealing with current circumstances?

Mr Lipsett: I think this section is an attempt to ensure that Ontario and Canada consumers are protected for their long-term electricity needs.

Mr Charlton: I understand the rhetoric of what you are saying, but the present reality is that

all we export is energy that is surplus to our system; so the only precedent we would be setting in the current circumstances under the free trade agreement is an obligation to sell some percentage of the surplus electricity in our system into the future. That, as I see it, does not endanger Ontario consumers and Ontario industry if the only precedent we are setting is around surplus energy on the system.

What I am trying to find out is, what is the real intention of this section? What are the ministry and Hydro planning for the future that we need this protection for?

Mr Cureatz: Could I have a supplementary on that, Brian? I never thought of it that way. How about putting what you are really saying this way? Under the old act, were there provisions for Ontario Hydro to enter into contractual arrangements?

Mr Lipsett: Basically, I believe this section is to ensure that the terms for export are met on a priority basis, not on a proportional basis under the free trade agreement; therefore, contracts we would make in the future would be based first on requiring that Ontario Hydro ensure that any electricity is surplus to our needs and not on the proportional basis that is in the free trade agreement.

Mr Charlton: That is the question I asked a moment ago. If all you are exporting at present is surplus, as I read the free trade agreement, the only obligation you then proportionately project into the future is around surpluses, not around your own requirements.

Mr McGuigan: Our conservation programs are going to create the surpluses.

Mr Charlton: Sure they are. That is why we keep telling you that we do not need another plant, Jim. But I am glad to hear you admit that, finally.

I understand the concern around the proportional thing but, as I understand the free trade agreement, the proportional thing is related to the precedent you set for the three years preceding a need on your part to cut back.

In other words, your surplus has been reduced, and the proportional thing would require you to continue to sell a certain proportion of that surplus to whomever you had been selling it to across the border. But if the only precedent you are setting is around surplus sales, what does that have to do with protecting the base load requirements in Ontario?

What I am trying to get on the record is some clear statement from somebody of what this

section is really intended to protect us from. What are the plans of the ministry and Hydro around firm contracts?

Mr Jutlah: Let me go back for a moment to the interpretation of the proportional sharing arrangement under the free trade agreement. That aspect of the agreement would put an obligation on the part of Canada, for example, to continue to export a certain percentage of its production of power if at any time there was deemed to be a shortfall. That proportion which will have to be maintained would be based on the levels of exports in the previous three years.

1040

The question, I suppose, which you are trying to address is whether the exports in fact represent surpluses in the first place. We used to have a policy within Canada which provided for the export of power, the export of energy, which was surplus to foreseeable Canadian needs in the long term. We are moving away from that concept under the free trade agreement, so the export of power is not tied to the concept of surpluses to Canadian needs.

Mr Charlton: Are there specific plans in Ontario around the firm export of electricity?

Mr Jutlah: There are none that I am aware of.

Mr Charlton: So regardless of what is happening nationally, in Ontario where this legislation will apply—it will not apply anywhere else—we are still dealing in terms of selling power that is surplus to our system. The only plans in terms of facility construction that I have heard about, presented by Hydro, relate to the needs of our system here, not to building any plants for export.

Mr Jutlah: That is my understanding.

Mr McGuigan: There are certainly no plans that I know of or any of us on this side of the table know of. However, I cannot see any harm in putting in a clause that would limit some future government that might have—

Mr Charlton: No, a clause which may limit.

Mr McGuigan: May or shall.

Mr Charlton: Obviously, if this passes and this ever becomes an issue under the free trade agreement, there are going to be some legal challenges going on.

Mr McGuigan: That is fine, but all it really does is bind this government or a future government, more likely a future government, from selling power unless a proper price arrangement is made.

Mr Charlton: The federal government has already said that there would be legal challenges if it ever becomes an issue. It is a contradiction to the federal legislation. Why do you think it is in there? Why do you think it is in there if it is not supposed to protect from the free trade agreement? That is what it is all about. That is what they just told us this section is all about. It is the proportional stuff they are talking about.

Mr M. C. Ray: I think that is just the point of the statement of the former minister, Mr Wong, when he came before the House on the presentation of this bill. I can read from the record, from Hansard. He said:

"The trade agreement weakens the federal government's role in securing our energy future. Unlike the General Agreement on Tariffs and Trade, the trade agreement includes obligations with respect to electricity.

"The trade agreement also contains proportional access provisions with respect to energy supplies, including electricity, which would be far more restrictive than the General Agreement on Tariffs and Trade. Under the Canada-US free trade agreement, Canada would be required to share its energy production proportionately with US customers in times of reduced supply."

Mr Charlton: I know what the section says and I—

Mr M. C. Ray: "The energy provisions in the trade agreement pose a real threat to our future energy security.

"Under the amendments to the Power Corporation Act, Ontario Hydro will be required to give priority to the needs of domestic energy consumers when considering export contracts for electricity. Ontario Hydro will be required to ensure that any sale of electrical power proposed under an export contract is surplus to the requirements of Ontario and other customers in Canada. Furthermore, Ontario Hydro will be required to ensure that the export price is higher than the price charged to Canadian customers for equivalent service."

Mr Charlton: That speaks directly to the question which I have just raised. Presently the only power we sell is surplus to the system and it is also on an interruptible basis. You tell me—I am asking somebody to explain to me in legal terms, how we need this section to protect us when the contracts you have are all interruptible, unless you have plans to go into firm contracts which everybody says, "No, I am not aware of any."

Where does that set of comments you just read from the minister—sure they would apply if we

had some intention of signing firm export contracts that would lock us in under the proportional section of the free trade agreement, but when all that we are dealing with—and all the people who have responded to my question have said they are not aware of our moving away from that in Ontario—all we are dealing with are interruptible contracts. How is that proportional section going to have an impact on a contract which is written to say it is interruptible? When you need the power, you do not have to supply it, that is what your contract with the buyer says.

Mr McGuigan: I am going to try and answer that. I am going to repeat what I said before. It binds governments from making firm contracts without—

Mr Charlton: This amendment does.

Mr McGuigan: Yes.

Mr Charlton: It does not bind them from making firm contracts.

Mr McGuigan: It puts the terms under which they would have to make them.

Mr Charlton: That is right, but it does not stop them from making firm contracts.

Mr McGuigan: No. I would think you would want to see that provision.

Mr Charlton: Nobody can give me an appropriate comment about why we need this section to protect us in the case of the kind of circumstance we have now, which authorizes the corporation to retain any surplus funds held to the credit of any municipal corporation as security against future obligations.

Section 31 agreed to.

Section 32:

Mr Lipsett: Section 32 authorizes the corporation to require customers in rural power districts to give reasonable security to the corporation.

Section 32 agreed to.

Section 33:

Mr Lipsett: Section 33 requires the board of directors to hear complaints as to rates charged for power and makes provision for a committee to hear such complaints.

Section 33 agreed to.

Section 34:

Mr Lipsett: Section 34 of the bill amends regulation-making powers of the corporation. We have an amendment to section 34 which, I believe, has been circulated previously. The amendment is to subsection 34(1) of the bill, clause 93(1)(f) of the act.

The Chairman: Mr Lipsett moves that clause 93(1)(f) of the act, as set out in subsection 34(1) of the bill, be amended by adding at the end, "or under a rule of a person supplying power to such works."

The Chairman: Any explanatory comments to the amendment?

Mr Lipsett: Yes. The explanation is that the proposed amendment to the bill authorizes Ontario Hydro, subject to the Lieutenant Governor in Council's approval, to adopt and enforce the rules of suppliers of power that are either municipal corporations or commissions and also for those that are not. It has been brought to our attention that there are areas in the province, such as Great Lakes Power and Cornwall Electric, that do supply power in Ontario. Most of the codes and standards relate to safety items.

Motion agreed to.

Section 34, as amended, agreed to.

Section 35:

Mr Lipsett: Section 35 amends subsection 95(2) of the act, which authorizes the corporation to make orders fixing the rates to be charged by municipal corporations or commissions of any municipality.

Section 35 agreed to.

Section 36:

Mr Lipsett: Section 36 is housekeeping in nature in language policy.

Section 36 agreed to.

Section 37:

Mr Lipsett: This section makes the bill subject to proclamation.

Section 37 agreed to.

Section 38 agreed to.

Title agreed to.

Bill, as amended, ordered to be reported.

The Chairman: Thank you. Any further comments on any matters?

Mr Charlton: Mr Chairman, I raised the matter with the committee the other day of the possibility of a letter from the committee to the minister dealing with a number of the other issues which have been raised with the committee during these hearings, but which are issues which do not directly relate to Bill 204 so the committee has not been in a position to deal with them, issues which I think we all agree in one way or another, regardless of our position on the issues, must be resolved and resolved fairly quickly as we move into the process and the next crucial

period around electricity and energy questions in Ontario.

I have very quickly this morning drafted a rough proposal to give members a sense of what I had in mind. I tried not to express a view on the issues that I felt needed to be raised with the minister but simply to suggest that they needed to be resolved. Before I make any motion I thought it might be useful if we quickly heard the comments of members as to whether in general they think this approach is acceptable or whether there are specific words in the draft that bother them. I have not had the opportunity to edit; there are a couple of long, run-on sentences that probably should be broken up but I think if we can get general agreement we could leave it to the chair and the clerk to edit.

The Chairman: The chair respectfully declines to edit. The chair would prefer if the committee wants to write a letter that the committee provide the chairman with the text and the direction to send such text.

Mr Charlton: Fair enough.

The Chairman: Thank you. Does the committee want to discuss this at this time? Would members prefer to adjourn for a short period to collect their thoughts and discuss this a bit later? I am in the hands of the committee in terms of what to do here.

Mr McGuigan: Mr Chairman I would say that we adjourn for a half hour.

The Chairman: Is that agreeable to the committee?

Mr Cureatz: If I might speak to it, that is fine with me although I do not know—if the vice-chair feels that a half hour is needed, that is fine. Might I say that we are supportive of the proposal. The chairman would like the staff to have prepared or—what does the member for Hamilton Mountain have in mind: that we will prepare a letter later, or—

The Chairman: —stick to that, I will—

Mr Charlton: The chair has said that he wants us to agree to the wording now.

The Chairman: Yes, I would think that is the best way, if the committee feels it wants to do that.

Mr Charlton: Perhaps if there are serious concerns about words, they should take their half hour now.

The Chairman: All right, shall I adjourn the committee now until 11:30 am?

Mr McGuigan: Rethinking that, how about two o'clock?

The Chairman: I see no serious objections anywhere. All right, therefore, I will take that as a motion from Mr McGuigan to adjourn until two o'clock.

All those in favour? Any opposed?

Mr Cureatz: Well, speaking to the motion—

The Chairman: I do not know whether we speak, but I will let you speak.

Mr Cureatz: All right. Do you want to get back to somebody over at the ministry office and see if we are going to be doing this? My thought was, with the new chairperson being appointed, they are obviously thinking of doing something.

The Chairman: One point is, the new chairperson is not here.

Mr Cureatz: I know, but—

Mr McGuigan: We are not under any time pressures so I cannot see any reason why—

Mr Charlton: It is the last item we have to deal with.

Mr Cureatz: Let us do it before noon. I mean, three hours. Can you not get back at noon?

Mr Charlton: The only reason I am trying to be so accommodating is that I want these guys to feel like they can deal with it in a way that they can come to a conclusion that it might be acceptable.

Mr Cureatz: Okay, agreed.

The committee recessed at 1103.

AFTERNOON SITTING

The committee resumed at 1411 in room 228.

The Chairman: I call this meeting of the select committee to order. When we adjourned, we had before us a draft letter from Mr Charlton. Is there any further discussion of that letter?

Mr Cureatz: Before we do get into that discussion, it is my understanding this will be our last order of business and there is some speculation about whether the committee will continue or not. I suspect it probably will. In any event, this will be your last day for committee hearings. Might I say, as the Conservative member representing the caucus on the committee, how much I have appreciated your direction as chairman of the committee? We appreciate it very much.

The Chairman: Thank you, Mr Cureatz. Any comments?

Mr McGuigan: I have a comment on the letter.

The Chairman: I was not soliciting any further comments on myself.

Mr Charlton: Perhaps just very briefly I can endorse the comments of the third-party member and express my personal thanks to you for the work you have done, both during these sittings and during the hearings last year. We never actually got together and sat as a full committee after the report was finished last January and I think we all appreciated not only the time we spent working on very important matters but also the areas of agreement that we managed to find under your chairmanship. We wish you all the best.

The Chairman: I appreciate that. I have to say I found this committee one of the easier to work with that I have been on. Oddly enough, it is dealing with one of the more contentious issues. I do not know if that is a lesson to be learned; that the harder the issue, the better the committee works.

Mr McGuigan: We will not let this side of the committee not be heard from in this matter. I think I am speaking for all when I say we appreciate your even-handed and very knowledgeable way of dealing with committee matters. We join other members in congratulating you on the good job that you have done.

The Chairman: Thank you, Mr McGuigan. Now I think you had some comments on the letter as well?

Mr McGuigan: My first comment is on a matter of procedure. I see what we are doing here in a rather small way as being comparable to writing a report. I think it would be better for all of us if we went in camera on this, so it is entirely the result of the group here and not have staff here.

The Chairman: Is that a motion to go in camera?

Mr McGuigan: Yes.

The Chairman: Is there any discussion on that? All those in favour? Opposed? We will then resolve to go into an in camera session to discuss the letter.

The committee continued in camera at 1415.

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SELECT COMMITTEE ON ENERGY

Chair: Carrothers, Douglas A. (Oakville South L)

Vice-Chair: McGuigan, James F. (Essex-Kent L)

Brown, Michael A. (Algoma-Manitoulin L)

Charlton, Brian A. (Hamilton Mountain NDP)

Cureatz, Sam L. (Durham East PC)

Grier, Ruth A. (Etobicoke-Lakeshore NDP)

Matrundola, Gino (Willowdale L)

Ray, Michael C. (Windsor-Walkerville L)

Runciman, Robert W. (Leeds-Grenville PC)

South, Larry (Frontenac-Addington L)

Sullivan, Barbara (Halton Centre L)

Substitutions:

Lipsett, Ron (Grey L) for Mr South

Morin-Strom, Karl E. (Sault Ste Marie NDP) for Mrs Grier

Clerk: Deller, Deborah

Staff:

Leitman, Marilyn, Legislative Counsel

Richmond, Jerry M., Research Officer, Legislative Research Service

Yeager, Lewis, Research Officer, Legislative Research Service

Witnesses:

From the Ministry of Energy:

Jutlah, Cliff, Manager, Electricity, Liaison and Planning Branch

From Ontario Hydro:

Robinson, Linda, Acting Senior Analyst, Government Relations Department



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Hansard

Official Report of Debates

Legislative Assembly of Ontario

Select Committee on Energy

Organization

Global warming and the greenhouse effect

Second Session, 34th Parliament

Wednesday 20 December 1989

Tuesday 27 February 1990

Speaker: Honourable Hugh A. Edighoffer

Clerk of the House: Claude L. DesRosiers

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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Wednesday 20 December 1989

The committee met at 1550 in committee room 2.

ORGANIZATION

The Chair: Shall we get the activities under way? We have representatives from each party here. The first item on the agenda is the election of a vice-chair. I wonder if we have a motion to that effect.

Mr McGuigan: Yes, Madam Chairman. I take great pleasure in submitting the name of Michael Brown.

The Chair: Are there further nominations?

Mr Pollock: I will move nominations closed.

The Chair: Mr Brown has just been elected vice-chair by the committee.

On the next item of business, I wonder whether before we move to this section I can ask you to think—I assume everyone on the committee has seen the allocation for sitting that has been given to us by the House leaders: one week now, in the first session. If you could think about this before we get on to the times and dates, there is opportunity to request permission for additional sittings and I thought we could kind of informally look at the other committees we are sitting on, because we definitely will need more time on this.

Mr Charlton: Did the motion not also say that we could sit concurrently with the House?

The Chair: Yes; that is right.

Mr Charlton: But we have basically only been allocated one time to generate this interim report.

The Chair: Yes.

Mr Charlton: So what we are basically going to do in our interim report is tell them what we think we need to do and how much time we need to do it.

Mrs Grier: Could I ask why those times were put in the motion.

The Chair: The interim report would be largely to place the issues before the House in advance of federal-provincial meetings that are coming up in the spring, and so that the summer activity could relate to the results of the federal-provincial—

Mrs Grier: I think that is what we are talking about.

Mr Charlton: Yes.

The Chair: Yes, but I think we will need more sitting time. Perhaps you can sort of keep your own schedules in mind and then we can get to that later.

Striking of the business subcommittee: We have the standard motion here. I wonder if the caucuses would like to put forward their names and then we can—

Mr Kerrio: How many are going to be on that committee?

Mr Charlton: One from each caucus.

The Chair: Yes, one from each caucus.

Mr Cureatz: And the chairman.

The Chair: The chairman, that is right, and Mr Brown as vice-chair.

Mr Pollock: I move Sam Cureatz.

The Chair: And there is Mr Charlton, so the names that would fit in would be Mrs Sullivan, Mr Cureatz, Mr Brown and Mr Charlton. Would somebody make that motion?

The Chair: Mr Kerrio moves that a business subcommittee be appointed to meet from time to time at the call of the chair or at the request of any member thereof to consider and report to the committee on the business of the subcommittee; that substitution be permitted on the subcommittee; that the presence of all members of the subcommittee is necessary to constitute a meeting, and that the subcommittee be composed of the following members: Mrs Sullivan, Mr Cureatz, Mr Brown, Mr Charlton.

Motion agreed to.

The Chair: To go into the meeting and dates discussion, we have been assigned one week of meetings, or time for one week of meetings, by the House leaders' agreement. That is the week of 5 March 1990. Most of the Liberal members, and I checked with our whip, are available other than one, I believe, Mr McGuigan, for the week of 5 February.

Mr McGuigan: I am available. I have gone off the resources committee.

The Chair: Have you? That would mean all our members would be available for that week.

Mr Charlton: I have a problem.

The Chair: You have a problem?

Mr Charlton: Yes. We are parleying around the standing committee on general government, which I am on, and the standing committee on the Ombudsman on the auto insurance issue. I am going to end up on one of those two for that week.

Mrs Grier: Could you perhaps give us some sense of how you see this committee proceeding. It is an enormous subject. As Mr Charlton was saying, I think that by a requirement for an interim report, all we will really have done is maybe define the issues and decide where we want to concentrate, but I guess I am unclear how we even get to that point. There is no point doing independent research, but perhaps somebody could pull together what has been done, or how we define the experts or what the mandate of the provincial government would be.

The Chair: First of all, it is an enormous task, and it is an important task given that it in many ways coincides with some of the work that would be done during the environmental assessment hearings on the Hydro DSPS. The reason for that is that if, by example, we are looking at some of the recommendations for reductions in carbon dioxide emissions that have been put forward, whether it is reducing the concentration or reducing the emission level—the recommendations are that the reductions in emissions be 20 per cent by 2005—we are then going to have to make very serious choices in Ontario, as a heavily industrialized province. A lot of the choices will have to be made in the industrial sector.

One of the things that of course is of grave concern is companies such as Inco and Stelco, mainly the natural resources companies, that use heavy amounts of fossil fuels in their process operations. If they decide, to meet any provincial or federal government requirements or international commitments, to move to electricity, then we are going to have to take a different look at the way we handle electricity generation and supply requirements.

One of the reasons, as I understand it, that the federal and provincial ministers did not sign and agree to concur with the 20 per cent reduction that has been recommended to the industrialized nations is that they had no information how that could be done, if it could be done and what kind of measures could be put in place. What this committee is really being asked to do is to say: "If we were to move to a specific target, how could we move to that target? Over what period of time? What would be both economically and

environmentally feasible? What programs and incentives would have to be put in place to ensure those targets were met?" Those are the kinds of things we would have to look at.

In my view, to really study those issues carefully in the depth they will have to be studied in and to put forward those recommendations, we will need prominent professional assistance. We will probably have to have an economist and an energy specialist on the committee. One of the things I do not know—some people here who are more experienced with committee work will be able to tell me—is whether there were ever people seconded from ministries—we may want to think of that—or from a university. Those are the kinds of areas I think we should be looking at.

I have set up a meeting with Dr Hare, who happens to live in Oakville, to talk with him over the holidays on recommendations of some names to come forward on the energy-environment side.

1600

Mr Kerrio: He did a study on safety for us.

The Chair: That is right. He is also one of the Canadian experts on the greenhouse effect. He is very interested that the committee has been asked to take this on and I think he will provide some assistance to us, including putting forward names.

There is no question that we will also need help on the economic side to assist us with the framing of questions about the changing technologies in various sectors that can be used to mitigate the emission levels and to do an analysis of the financial cost of those.

There is some interesting wording—let me find it.

Mr McGuigan: Just for the record, who drew this up?

The Chair: Part of it was done through consultation with people in the environmental field. It was put forward as a suggestion after that consultation. When it was put forward, there were a few changes made, but few changes made in the conceptual approach. I put the suggestion forward, having had discussions. I did not expect it was going to be on the order paper quite in this form. However, frankly, it gives us a lot of scope.

Mrs Grier: You thought this was going to be the committee's report, not the committee's initiation.

The Chair: No, I did not think this would be the committee's report, but I felt these were questions that had to be looked at and could be

looked at in a general discussion. I had expected that the mandate would be a little shorter.

Mrs Grier: I find this is a lifetime career.

Mr Callahan: I hope we have enough energy for this.

Mr Kerrio: Would it be appropriate to have the subcommittee meet and make a recommendation to us?

Mr Charlton: I was just going to suggest a couple of things we can deal with very quickly.

Mr Kerrio: I would like to make that as a suggestion.

Mr Charlton: The chair is right and Mrs Grier is right that the whole thing is a very complicated topic. It is something that I think we are all interested in, but very clearly we are going to have to focus on a place to start. My suggestion would be that now we have set up the business subcommittee, we ask that business subcommittee to meet and come back as quickly as possible to the full committee.

I think it is going to take us the week they have allotted to us just to specifically set out a work plan for the summer. Perhaps in the interim we could get briefed by several experts in sort of one-day sittings, which might help us in that week to focus on what aspects of this whole thing we need to pursue most urgently and what aspects of it are associated with the answer to the first question; in other words, the stuff that you cannot do until you have done this first.

If we can get to that stage through some briefings over the course of the next three months, and sit down for a week and hammer out a real work plan that focuses on the things we really have to start with, that we have to understand first, then I think that is about all we are going to be able to accomplish before the House actually goes back and then we can make an interim report, which makes comment on that and suggests our work plan for the summer.

Mr Callahan: In looking at this and in the overall perspective of it, we are going to have to look at it not just in terms of the insular approach we take to things, such as Ontario or even Canada; there are obviously things we do or do not do here in Canada or in Ontario—buying energy outside of Canada just enhances and increases the use of fossil fuels by New York and it spills over on to us.

It is really a very wide program and it has to be looked at. I would hope that the subcommittee, in dealing with that, would zero in on that too. It is not just to be an Ontario thing or even a Canada-wide thing. It should be something

outside. Whether we get that by getting studies from other countries or however we do it, I think we have to do it.

Mr Pollock: What are we talking about? Power from a whole lot of different sources such as water, nuclear?

Mr Kerrio: Whatever we recommend.

Mr Callahan: I do not think there should be any limits on it because in fact if you are looking at water power—

Mr Charlton: This basically looks at the entire energy package.

Mr Callahan: Sure it does.

The Chair: That is right.

Mr Kerrio: Yes, as to how it affects the warming effect.

Mr Callahan: The greenhouse effect affects the efficiency of the water generated, the amount of water you have to create power, so you have a whole host of things.

The Chair: The other question we may want to consider as we go through it and as we develop a methodology of approach is whether, by example, in our travels we want to go to the petroleum industry in Alberta and Saskatchewan and look at the gas and look at where—although we may be using a fairly clean technology in some of those areas, what is happening in Alberta, in those provinces, in terms of emissions there as they are burning gases and so on. We see the process losses occurring at source within the country.

Mr Charlton: When you look at a question like global warming, you not only look at questions such as carbon dioxide emissions and the measurable things you can determine such as that; you also look at what we know about nuclear plants and the heating they do of the water they use in their cooling processes which they then dump back into the lakes at the same time as the carbon dioxide is sealing the atmosphere and holding that heat in. There is a whole range of things that all interconnect and have an impact. You basically have to look at that whole range.

Mr McGuigan: I would hope, though, that we do not spend a lot of time on water power, because looking into the future, if we need to—

Mr Charlton: There is not a lot of it available.

Mr McGuigan: If we look at Hydro's plans and we look at the future at some distance, the big increase is going to come from nonwater.

Mr Charlton: I guess the only point I was trying to make, Mr McGuigan, was that if you

are really concerned about the global warming question, you do not just look at things with smoke stacks on them like coal plants, because the nuclear plants are part of that game as well in terms of the tremendous amount of heat they are dumping into the environment.

Mr McGuigan: You did not let me finish. I said that the big increase is going to be nonwater.

Mr Charlton: That is right; there is no question.

Mr Cureatz: Madam Chair, I am surprised you only have one week in March. You would have thought that we could squeeze in a week in January.

Mr Callahan: I think we have been given liberty to—

The Chair: Yes. We do have the authority to sit at any other time. What I was hoping was that we could combine our schedules to find other days, if not full weeks, and I think that would be very useful. We certainly will need more than the one week. We can sit as well after the House resumes and that might be useful to us, but they want us to have the interim report when the House comes back.

Mr Kerrio: Are we limited to the days to get the report together, as to the number of days we can sit between now and the House—

The Chair: No.

Mr Kerrio: Okay, then we should be structuring—

1610

The Chair: Frankly, the problem is melding our schedules together.

Mr Kerrio: Yes.

The Chair: Particularly given the fact that the opposition parties' members are sitting on so many committees.

Mr Kerrio: Sure.

Mr Charlton: That is right.

The Chair: It is more difficult for their members than it is for ours.

Mr Charlton: To get back to my suggestion, Mr Cureatz, I think the steering committee could meet very quickly in January. We could decide on three, four or five experts we would like to have do some briefing of this committee. We could pick four or five days over the course of January and February in which to do that, and then sit down in that first week in March and hammer out a work plan that we can make part of our interim report.

Mr Kerrio: You do not need a motion to do that, do you, Madam Chair?

The Chair: No.

Mr Kerrio: We all agree.

The Chair: I think the authority in the motion is that under the standing orders, the meeting can be called at the call of the chair.

Mrs Grier: If you read further on, with the agreement of the House leaders, "committees may meet during the winter adjournment at times other than those specified in the schedule tabled today."

On my suggestion of days, I think that if there we are going to be briefed, it has been my experience with these very technical kinds of issues that if we could find a week and do it in a block of time, we are much more likely to absorb it. If you come in each week for one day, you have to get your head back into the whole subject again. I would rather have a week and try to understand something by Thursday.

Mr Kerrio: If I may put something on the plate of the subcommittee that I think is relative to the whole situation and requires the economist involved and/or the kind of expert who would talk about the warming effect, there is an element that comes into play here that should become obvious to all of us.

I am very disappointed that the government of Canada has seen fit to go into the whole circumstance of deregulating and watch the Americans grab up long-term contracts for western gas, for two reasons. The first is that Ontario is so dependent on energy and for the longest time the western provinces decided that generating electricity with natural gas was not a high enough use of natural gas.

I do not think many people would object to the fact that wherever you have to burn fossil fuel, I would prefer to see us burning natural gas, for one very good reason. We have to build up demand on that supply because the Americans, under the free trade agreement, have been given an undertaking by the Canadian government that they are going to be entitled to the amount of natural gas that they are taking at a given time whenever there might be a shortage for any reason.

The Americans are pretty cute. They are looking at some of our huge deposits—the cheapest gas comes right off the top—building up that demand so that in the event of a shortage, the province that is going to suffer most of all will be Ontario. Having said that, wherever it is possible, instead of having a coal-fired plant with

a scrubber on the back that uses 15 per cent of the power to run the scrubber and an endless number of trucks trucking the stuff away to a landfill site—if we have to have nonrenewable fuels, it should be natural gas. I would hope that we would look at that aspect of it very seriously with the western provinces, about the supply of natural gas to the province.

Mr Charlton: Mr Kerrio, we would like to see some serious research pursued in terms of eliminating the air compressors on those gas turbines which, as you said with the scrubber, use up about two thirds of the power that the turbine produces and that we replace it with, as Mr McGuigan would want us to do, with hydraulic—

The Chair: I wonder if we could move back to today's agenda, because we do have a vote coming up and these are the very issues we will be discussing. I think that to make it easier for people to look at the mandate, which is all sort of crunched up here, if you look at the working document that was submitted as the idea, I think the specific issues that are outlined there will cover some of these points. It will give us something to noodle on in the break.

I also wonder if we could just go around. If you know what committees you are already sitting on, perhaps we can find another full week. Ruth, do you know what other committees you are sitting on and when they are sitting?

Mrs Grier: I am not so far.

The Chair: Okay.

Mr Charlton: I have the one week on the standing committee on the Ombudsman.

The Chair: You have that on the week of 5 February.

Mr Charlton: Yes.

The Chair: All right.

Mr Cureatz: I have the standing committee on the Legislative Assembly, two weeks on freedom of information. Actually, I do not even know when those weeks are.

The Chair: They are 15 and 22 January. Mr Pollock, do you know what other committees you are on?

Mr Pollock: I am on Ombudsman.

The Chair: You are on Ombudsman.

Mr Pollock: So that is out anyway.

The Chair: I think we have the list for all the Liberal members.

Mr Callahan: There is also one other week to be kept out of there. It is the week of our caucus retreat.

The Chair: Yes. There are no committees sitting at all the week of 29 January.

Mr Charlton: That is the weeks of the 15th and the 22nd?

Mr Callahan: Yes.

Mr Cureatz: When is the Liberal caucus?

Mrs Grier: There are no committees the week of the 29th.

The Chair: The caucus retreat, as I recall, does not start until the Wednesday. We could perhaps sit Monday and Tuesday of that week, if that would be convenient.

Mr Callahan: I cannot.

The Chair: You cannot; okay.

Mr Charlton: Maybe even Thursday.

The Chair: I will have to look and see what the agenda is.

Mr Callahan: Our caucus retreat starts on the Thursday.

The Chair: Starts on the Thursday?

Mr Callahan: No, it actually starts on the Wednesday.

The Chair: It starts on the Wednesday.

Mr Callahan: So it is Wednesday, Thursday and Friday. I would suggest we leave that week free.

The Chair: The week of 8 January: Is that useful to anyone?

Mr Callahan: The week of the 8th?

The Chair: The first week. The standing committee on general government is the only committee sitting that week.

Mrs Grier: Does that give you time for the steering committee to meet?

Mr Callahan: I thought no committee was permitted to sit until the 15th.

The Chair: General government is sitting that week.

Mr Callahan: Is that right? That is the week of the 8th. That is fine.

Mr Charlton: That is outside the standing orders, by motion.

Mr Callahan: The week of the 8th sounds good.

Mr Charlton: I think the week of the 8th is a good time for the subcommittee to sit down and hammer some of this stuff out.

The Chair: All right. Why do we not do that?

Mr Kerrio: Anything we can funnel into the subcommittee to have you examine, we will do that.

The Chair: Good.

Mr Cureatz: You are going to call subcommittee for the first week of January, just to say—

The Chair: That is right. At that time, during the first week of January as well, we will also attempt to gather together recommendations relating to professional staff to be engaged and travel requirements. There is one other request I hope to put before the House leaders, although it has not been agreed to by the House.

I was hoping that some or all of the committee could visit the United Nations environmental agency because the work it is doing is really in the co-ordinating role of international work. I do not think we have to go anywhere else, but it would be useful for at least some people of the committee to go there. I do not know if we will get permission. International travel has not been

allowed this time. New York is not that international, I suppose, but it is out of the country.

Mr Charlton: I do not want to walk that far.

The Chair: That is right. I think it would be very useful for us to sit down with the people at the environmental agency in New York at the UN. The budget will be contingent on that so we will have to come back to the committee with a budget as well. Is there any other business for today?

Mr McGuigan: As I mentioned, I am not on the standing committee on resources development.

The Chair: That is good to know. Could I have a motion to adjourn.

The committee adjourned at 1619.

For the natural emissions, there is a fairly well agreed upon grid that has been used, and at least it is comparable for all gases that it is done for. The same grids are used by the federal government for the man-made emissions. Basically it is a tally. You go through the industrial types within certain census divisions that fit into the grids and add them up. Of course, any type of summation of that sort has errors throughout in a number of things.

Mrs Grier: But it is based on actual installations, as opposed to calculations and formulas that make assumptions that if there is this amount in one grid, then you can assume that in similar grids the same exists.

Mr Yeager: That is the basic principle behind most of the emissions inventories that Environment Canada has done and some of the ones, for example, for volatile organic compounds that the provincial Ministry of the Environment has done. I expect that the carbon dioxide one—the federal data are based on something of that sort as well, but I am not really certain. Some of the witnesses who are scheduled to come before you will be able to address that specifically. But there is a historical precedent for these things being done in that fashion, so I would expect that with an order of magnitude, it is probably a reasonable first approximation.

Mr Charlton: My question relates to the extension of that discussion you just had. The CFCs thing is totally artificial, totally attributable to man, but with both CO₂ and methane we have both natural sources and man-made sources.

Mr Yeager: That is right.

Mr Charlton: The pie charts you have given us just talk about the man-made sources.

Mr Yeager: Yes.

Mr Charlton: Do we have numbers? Can you provide us with numbers that will give us some kind of indication as to what science feels natural levels of CO₂ and methane would be so that we can see how much it is we are adding in percentage terms? It makes a difference, I think, in our understanding of the problem if you are adding 500 per cent as opposed to 50 per cent over what natural levels would be and therefore looking at what you can do to get back closer to those natural levels.

Mr Yeager: I think we will be able to do something of that sort, particularly with the methane. Certainly there will be no province-by-province inventory of natural methane emissions yet, but it should be fairly straightforward to

come up with some sort of rough percentage. Somebody, I hope, has done that.

Mr Charlton: Yes, I think that is what we need, something that will give us a perspective on how much we have added as an industrial society and what it is we are trying to deal with in terms of where we are trying to get back to, or back in the direction of or whatever.

Mr McGuigan: Population growth is a part of that factor. If you compare what it was 2,000 years ago with today, most of it would be due to population.

Mr Charlton: I think all of that is true. I think unfortunately we are going to have to try and deal with today.

Mr Yeager: Taking methane as an example, there is a huge extent of wetland in northern Ontario that releases methane all the time. The agricultural production of methane is probably substantial too. With these gases, though, the ones that can be controlled are the ones that are point sources largely and, more often than not, the man-made ones. The background of naturally produced ones is constant, or relatively so; at least, it is varying in ways that we have no control over. When it gets down to it, the same argument was used early in the acid rain discussions. There certainly is a lot of natural sulphate produced and emitted from bogs and other areas.

There is a substantial amount of atmospheric sulphur that is produced naturally, but when it comes down to control measures it is really irrelevant how much natural there is, because the only ones we can do anything about are the point sources, and largely the man-made ones. I will try to put that into a better perspective as we get farther on.

1050

Mr McGuigan: I just want to add a little information. I cannot give you the exact source of it now because it is something I read about 20 years ago; it was probably in Scientific American. It said that the dung heaps of the Egyptians are still emitting methane, probably due to the fact that it is such a dry climate and it would work very slowly in that dry climate. As some indication of how long these landfills are going to continue to emit methane, the Egyptians' dumps are still emitting it.

Dr Harvey: I can make some comments now, if you want, on the methane issue, or leave them until later. Do you want me to wait until later?

The Vice-Chair: Now is good.

Dr Harvey: With regard to both the methane and the carbon dioxide, in the case of carbon

dioxide the human fluxes are very, very small compared to the natural fluxes. You might feel, "Why are we even concerned, there are such huge natural fluxes?" Photosynthesis takes out 20 times as much carbon dioxide every year as we put in. The decay of leaf litter and soil organic matter in the world's forests is about 20 times our industrial emissions, and you might say: "Why should we be concerned? Why are we even paying any attention to this?"

The key point is not the size of the human fluxes relative to the natural fluxes, but rather the fact that the natural fluxes, before humans came on to the scene, were very closely balanced. We have about 100 billion tons of carbon going into the air every year from the decay of leaf litter and plant respiration, but we have 100 billion tons coming out every year from photosynthesis. So the residual is very small; it is very close to zero. The five billion tons worldwide that we are emitting from fossil fuel use seems small compared to these gross fluxes, but it is significant compared to the residual. That is why it is a problem. We are perturbing what had been a very delicately balanced system: huge fluxes in either direction, but very closely balanced.

With the case of methane, there are also huge natural fluxes. The coastal wetlands of the world, the mangrove swamps, the peat bogs of the Canadian Arctic, are huge sources of methane, but there are also sinks of methane and we are perturbing a cycle.

In the case of methane, though, we have something going for us, and that is that the average lifespan of a methane molecule in the atmosphere is only about 10 years. What that boils down to is that if we can cut our fluxes by 10 per cent, that would be sufficient to stabilize methane at its current concentration. There are large natural fluxes. The human fluxes are also large, but the lifespan of methane is quite short and that greatly simplifies and eases the problem of stabilizing the methane emissions. If we can find 10 per cent worldwide, we can stabilize it.

I might point out that probably the methane associated with the cattle we consume in Ontario, but which is produced in Alberta, would be a very significant term in this table. Also, rice patties are a very significant source of methane.

Mrs Grier: Can I explore this stabilization?

The Vice-Chair: Perhaps you could explore with Dr Harvey. Dr Harvey will be the next presenter, so maybe we will let Lewis finish and then pursue this. Is that okay?

Mr Yeager: Sure. I think we are all sort of discussing the same things, so it is okay with me.

One of the last things I would like to just touch upon is the climatic observations and predictions. A number of witnesses who will be coming before you are going to be describing climate models and how they have made certain predictions, and many of the subsequent predictions of certain effects are based on these types of modelling results. I just want to touch upon a few of the principles involved with doing computer modelling and some of the strengths and weaknesses of it, so that when people start to discuss this you will have a bit more background.

The situation for climate modification is by no means simple, as we have outlined. Many chemical reactions are going on. They are all interacted. Carbon dioxide increases may stimulate plant growth, and therefore more decomposition of plant material and more methane. Many of these things are interactions. They are all plaguing the specialists who are working in these areas, but the main features of the process are somewhat clear and this is what the modellers attempt to describe.

Some of the things that affect predicting climate are the amount of ice cover that changes the reflectivity of the earth and the organic processes that are going on in the ocean that might affect carbon dioxide flux, and how the oceans store and release heat is not entirely understood in all cases. But there are two basic ways to look at the question of how much the earth's surface temperature will rise with the particular increase in carbon dioxide and the other gases.

The first is the obvious way. We can compare the present-day temperatures with those of historical records and see if there is a trend there. You can support that with biological and geological data that give you some indication of whether carbon dioxide concentrations were different in the past as well.

You can tell by the types and numbers of fossils of tiny forms of sea life or you can measure gas bubbles in old ice for their gas content, and you can tell the types of plants that were present at various times in the past. All these are indirect measures of both what the climate was like and probably what the carbon dioxide environment was. But of course there are shortcomings in looking at the past to predict the future, because many other things are changing as well.

The second way is to try to use some sort of mathematical model. The other factor I should have mentioned is that just because something has changed one way in the past does not mean

that it will continue to do so in the future. Certainly climate is not a straight-line type of thing. So what scientists try to do is establish a mathematical model that will simulate the major features of the climate that they have observed and then use that to simulate what may happen in the future if you change certain aspects of it.

Because there are a number of cyclical changes in the average earth temperature, both in the medium and in the long term—these are likely controlled by changes in the sun's energy output acting on whatever previous conditions there were—it is not a very simple thing to predict future climate, so you must separate out the warming trends that we are going to attribute to increased greenhouse effect from the various types of changes that were appearing in the past.

It now appears fairly thoroughly documented that some degree of average surface temperature increase has occurred since the records have been kept. There is fairly good agreement on that. It can be documented that carbon dioxide and methane concentrations in the atmosphere have increased. Again, you will have witnesses telling you about this in more detail, but these are fairly established now. There are some caveats to that, and I will go into that in a minute.

We are looking at probably about half a degree warming in the global average in the past century, and several of the recent years in the 1980s, particularly 1988, 1987 and 1981, reached the warmest years on record, so these are strong indications that this is not an imaginary trend.

When you hear the witnesses talking about a mathematical model that can be very intimidating, but really a mathematical model is a simplified version of the real world. I know that the math scares us all when we see it and there seem to be an enormous amount of things to take into account, but really it is a simplification. You cannot get all of the things going on there. The modeller tries to put the most essential parts of the world into his model, and he uses these mathematical representations of these major features of the real world processes to try to attempt to predict what will happen when you change certain of the conditions.

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You will hear quite a bit about these models and some of the uncertainties from your witnesses but the major features, when you are trying to do computer modelling, are first, you have to design a model that you have some confidence in, and second is the calibration stage. This is very important. When you calibrate

a model it means putting in certain data that you try to get your model to reproduce; that is, you know what the temperature or the conditions were like in a certain time period. You try to adjust your model so it can produce those same results for you. Then you know it can produce a certain decade of results. That is called the calibration. You are fitting the math in your model to try to give you something you already know the answer to. The third stage is a verification of that.

Then you try using that model to predict perhaps the next decade or the next year, without doing any more fiddling and see how close it can predict something new, that you already know about. Finally then, when you are satisfied with this, you can start simulating future conditions with some degree of confidence that it is more than just thin air.

The reason I dragged you through that little process is that calibration and verification of models costs a lot of money. I have spent a lot of my time in the past doing water resources modelling and almost never do you get the money to calibrate and verify your model to your satisfaction, which means you are modelling with something you are not entirely happy with. This is very important because the whole look at remedial measures and things can depend on just how accurate your modelling is.

The key to the good modelling is good calibration and verification of the model, if it is a good model in the first place. With these climate models, they are very large, complex models. They basically need what is termed a supercomputer to handle them. Since there are not many of these beasts around, you can imagine how easy it is, first of all, to get time on one to do these, and second, get someone to pay for it for you.

Mrs Grier: The University of Toronto has one.

Dr Harvey: Thanks to the Ontario government.

Mr Yeager: So you may hear some sceptical witnesses coming in and suggesting that further research is needed to handle these models, that you cannot count on what there is now. There is some sound basis for this, in that the modellers have seldom been given the computer time they need to really go at these models the way they want to, so it is one instance where throwing some money at a problem may in fact be worth while.

That does not alter the fact that the basic understanding of the global warming is reasonably well established through observation and

most atmospheric scientists are fairly convinced, but there is certainly a lot of refining that can be done. The sceptics do have a point and I do not think anyone is in disagreement that these models can do a much better job if they can get more time on the computer and get it paid for.

That would go towards calibrating and verifying the models to a greater extent than they are now and also collecting the basic data. You need the numbers to put in before you can have much confidence in what comes out the other end, so more of the good kind of monitoring that is starting to occur now will help that.

There is some reason to expect that in a five- or 10-year period the ability to predict the future, based on these models, will be better than it is now, probably to a fairly substantial extent.

The models they are going to be talking about apply mathematical expressions of physical laws to the atmosphere and to the oceans. These are the things they are trying to model, and the interactions between the two, both in heat and energy changes and chemical changes between the two. But it is also trying to incorporate the land, the biota or the living creatures, glaciers and ice fields and that type of thing. When you see that these types of things, on a global scale, are being looked at, you can imagine why the computing facilities and resources are so substantial.

These are all global models that I have been talking about. There are a couple of them, one from Goddard and one called the geophysical fluid dynamics lab model. They are basically handling global climate change, but there is also a need to try to develop some regional predictions of what is going to happen in certain areas. There the preliminary calculations have been made, but I think they are not very conclusive and I think most people would agree to that. They are suggestive but they are not what one would call reliable or conclusive.

There exist a number of reports on how Ontario's agriculture would be affected by a climate change or this type of thing. They need to be treated with a grain of salt. Probably in the two years since they were written ideas have changed considerably. You do have witnesses coming in who will be looking at a number of these sectors and they will have much more up-to-date information, I hope, on that. Basically they are taking the temperature degree from the global models and trying to apply it to specific areas.

The thing to remember about this process is that we are talking in relatively few numbers of average degrees over quite a substantial number

of years, but there is no reason to expect that this is going to be just a gradual average increase in temperature everywhere. The climate does not work that way. You may see a lot of substantial fluctuations in the way the atmosphere works and the oceans work, in jumps and starts, rather than just sort of a smooth transition. So there is a little bit more risk involved here than just a gradual smooth increase in temperature everywhere. Of course that type of thing is almost impossible to predict now because we do not know how the systems are going to react.

The basic controversy you are going to hear your witnesses talking about is that there is a lot of vocal scepticism now by some very respectable and knowledgeable scientists, especially in the United States, that the predictions by these models to date, particularly when—principally they are concerned that the variability in a lot of the things happening in the models is too great to be able to count on the very small value of temperature changes that is predicted, that comes out the other end.

They feel that the variability is such that you cannot have much confidence in a prediction of a degree or two change. The result of this is that they say expensive responses are premature until the modelling is refined or better data are collected. That is not a majority view but it is a significant one and not entirely stupid.

The two major uncertainties these people are talking about relate to the way cloudiness is handled in the models, and basically the way carbon dioxide moves between the oceans and the atmosphere, certain aspects of carbon dioxide dynamics. These things will be refined, but those are the two technical reasons, which do not need to concern you at all, that the modelling controversy is largely revolving around right now.

Very briefly I will just talk about a few regional effects, because we are going to hear lots of this type of stuff. You probably have heard of most of these in the newspapers, but I will just touch on them here.

Effects predicted by these greenhouse models and their implications: One is wetter subtropical monsoon rain belts; tropical storm activity probably increasing with more precipitation; longer growing seasons in higher latitudes that might affect parts of Canada; wetter springtimes in the high and middle latitudes that would affect us possibly; drier midsummer conditions in some mid-latitude areas. In the grain-producing areas in the west of Canada and the United States that is a very important consideration if that comes,

because that raises the possibility of drought conditions in the grain belt.

An increased probability of extreme heat waves with possible health consequences for people and animals in already warm climates: That would reduce the possibility of colder snaps. An increased likelihood of summertime vegetation fires in the hotter, drier regions; increased sea levels, and people have been saying as much as a metre or so over the next 100 years or so. There have been a couple of very recent papers that have come out that think that is overestimated, that the sea level rise might not be as substantial as first thought, but that is not a great factor in Ontario perhaps anyway.

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Interjection.

Mr Yeager: Hudson Bay. There are a number of possible agricultural effects for Ontario. You have probably most of these before.

Mr Callahan: If you are having droughts, how do the sea levels increase it? Is it because the rain is concentrated outside of areas where the land would absorb it and it is going into the oceans, or what?

Mr Yeager: Part of the projected sea-level rise is just the expansion of the water as it gets warmer. It is just a physical effect. Another part is that they have been talking about much of the water being from water stored in ice caps and glaciated areas which are melting. Now that may not necessarily be the case, because if the temperature goes up, evaporation may increase. There may be more precipitation in some areas. If there were more precipitation in the Arctic, you would get more snow and that would form ice. So it is not an entirely clear thing yet. Trying to balance these possibilities is occupying a fair amount of time right now. I think most people assume there will be some sea-level rise. It may not be to the extent originally thought.

Mr D. R. Cooke: How does salt water evaporate as compared to fresh water?

Mr Yeager: I do not think there would be much difference. There might be a minor difference, but nothing substantial that I can think of.

Just a couple of final thoughts perhaps: Based on the climate models to date, they are talking about a 12 per cent to 29 per cent decrease in the water supply in the Great Lakes. That is a year or two old. That may have changed by now. That has a lot of implications for hydro production and for water supplies for a lot of industries. That would affect the Great Lakes much more than the

ocean levels. That is a decrease in the water supply to the Great Lakes.

In terms of control strategies, we are going to hear evidence on a lot of ideas for that, so I am not going to get into that at all. The main thing will be, which gases do you target and which sectors producing those gases can you get some policy initiatives for? Something to remember, though, is that there is going to be a lot of international pressure to do things, because although temperature changes may be larger in the northern countries, and I suppose those in the far south as well, a very small change in average temperature in the tropics may be very important to the people and the biota that live there. They are close to the edge now in terms of drought. We are seeing droughts in a lot of Third World countries. That could aggravate it. A much smaller change there may be more important to them than to us.

Certainly, being an industrialized part of the world, with much of our carbon dioxide generated by public sector organizations like Ontario Hydro, we are really quite vulnerable to demands to make that kind of cut. So it may not be possible to act totally independently. I think in the coming years there is going to be a fair amount of international pressure to help them out. We have some witnesses coming from, I believe, Indonesia and some other Third World jurisdictions to talk about that aspect of it. I think that in a way Ontario might get off quite easily were many of these changes to occur, but we are looking at largely unpredictable changes as well and many of them could hit the Third World very hard. I think we are going to be hearing a lot from those people in the future.

That is sort of my overview of a number of areas. If there are any questions, I would be happy to try to answer them.

Mr Callahan: Throughout the course of the history of man there have been changes in areas of the world that at one time might have been desert and then became lush, green plains. You have indicated the reasons why these things are happening now, because of landfills and things that man has done. How did those changes take place before? As the professor here has said, if there was this fine balance between carbon dioxide and—what is the word I am looking for?—photosynthesis—

Mr Yeager: A balance does not necessarily mean that things are static. This is an equilibrium that he was talking about. Things do change. Volcanic activity can increase the amount of carbon dioxide.

Mr Callahan: How do we know or how is there any certainty of knowing or, if it is the case, how do you convince people that this is not just a natural phenomenon that is happening again, perhaps assisted a bit by our increased methane and CO₂ gases, but that it is just what happens?

Mr Yeager: There is a difficulty convincing people. That is part of the debate today.

Dr Harvey: To clarify my earlier comments, I said that the fluxes due to human activities were large compared to the natural residual. The natural system is not in a perfect state of balance. Otherwise, there would be no change, but the natural imbalances are much smaller than the imbalance that human beings have created. We can deduce that by looking at the rates at which carbon dioxide has changed and fluctuated over the last 10,000 years. For example, we definitely see evidence of climatic fluctuation, of oscillations in atmospheric carbon dioxide. But the key point is that those changes are much smaller than the changes anticipated over the next century due to human activities. They are smaller in magnitude and the rate of change is smaller. It is a very straightforward, back-of-the-envelope calculation to show that under business-as-usual scenarios, the carbon dioxide we put into the atmosphere over the next few decades will completely swamp even the largest and most rapid changes that occurred naturally over the last 10,000 years.

It is not that there is not natural change. It is rather that the rates of change being provoked by human activities are unprecedented: up to 10 times or even 100 times faster than natural rates of change. Even if a given level of climatic warming should be beneficial—and this is controversial—let's say for the sake of argument that a warmer world would be beneficial, if that warming happens too quickly, faster than forests can migrate and than natural ecosystems, human institutions and agricultural systems can adjust, it is the rapidity of change that could have disastrous consequences.

Mr Yeager: Could I add one point that follows from what was just said. If 10,000 years ago there was a climatic fluctuation, people would move or they would die. The system could adapt to that, but we as a modern society like to draw straight lines on maps and say: "This is someone's property and this is someone else's. This is a park." As things change, all of our traditional lines may suddenly become very difficult to live with. If the climate changes too rapidly, our social and political system may not entirely adapt.

I will give just a little example. There might be a wetland reserve that is the last example of a type of wetland in an area. The rest of it has been filled in and had houses built on it or whatever. That is fine as long as the climate stays the same, but supposing things start to dry up? There goes your little wetland. You do not have any other areas that can compensate any longer. We have made a very structured world for ourselves and it is much less able to adapt without there being winners and losers. So changes now might have many more implications for us than they did in the past when everyone was migratory to a certain extent and certainly less sophisticated in political structures.

Mr Pollock: There is no argument, I guess, about the fact that there is a general global warming trend and we basically believe that this is because of gases produced by man. However, how can we be absolutely sure that the earth is not spinning just a little closer to the sun and that is causing a little of the warming trend? I was surprised to know that in the wintertime the sun is actually closer to the earth than it is in the summertime. The only thing is that it is not hitting the earth as directly. Therefore, we have winter. How can we be absolutely sure that is not causing some of these problems then, not these so-called man-made gases?

Mr Yeager: The distance to the sun can be very accurately measured now, using various types of devices, but the sun does change. Although the distance is well known, the sun's strength does change. Its amount of energy varies in certain cyclical manners, perhaps in even longer cycles than we realize. Solar radiation does change, but those effects can be somewhat separated out from these others. There have always been those types of changes, but the possibility now is piggybacking these greenhouse effects on top of the natural variations that we have seen before, and these can be very large effects piggybacked on top. So I think there is a whole science involved with observing the strength of the radiation from the sun. It is a passion among a whole group of people. It is fairly well tied down and they certainly can measure the distance accurately now.

Mr Pollock: There is no evidence that it moves a fraction or a few miles, you might say, closer or farther away?

Mr Yeager: It would do so in a predictable way that could be taken into account. Certainly the sun is not always the same distance away in its orbit. There are minor changes, but those have been pretty well nailed down now. So you can take that distance effect right out of the equation

because we can compensate for it. The actual amount of energy put out by the sun changes, and that is a little harder to nail down. It is not thoroughly understood yet, but it is coming.

Mrs Grieg: Could we get on with Professor Harvey?

The Vice-Chair: I was just going to suggest that. Mr Charlton, you had a question.

Mr Charlton: I was just going to suggest that we move on to Dr Harvey before we run out of time, and then we can address questions to both at the end.

The Vice-Chair: Yes. Perhaps the committee would agree to sit until 20 after 12 or so.

We have Dr Dan Harvey, assistant professor, department of geography of the University of Toronto, with us to help us with this.

Dr Harvey: Maybe we could set this up while I am talking.

The Vice-Chair: Maybe we could take five minutes while you get set up.

The committee recessed at 1123.

1130

DR DANNY HARVEY

The Vice-Chair: I think that in light of the time we should maybe proceed.

Dr Harvey: I have to face you. The slides will be behind me. First of all, I want to clarify some confusion as to just what the greenhouse effect is. Ninety per cent of the reports in the newspapers and on television incorrectly define the greenhouse effect, so just for the sake of the record let's get it right once and for all.

The greenhouse effect arises because the atmosphere traps heat emitted by the earth itself, what is referred to as infra red radiation. All of us are at this moment emitting and absorbing infra red radiation. Todd Decker may have not realized this but he is absorbing infra red radiation that I am emitting to him and vice versa. When we are talking about the greenhouse effect we are talking about infra red radiation, the radiation that we, the earth, the trees, the clouds and the atmosphere emit. The atmosphere traps some of that infra red radiation so less of it gets through to space, thereby making the atmosphere and the earth warmer than they would be otherwise.

The greenhouse effect has nothing to do with trapping reflected solar radiation or reflecting infra red radiation; it is absorbing infra red radiation. At the recent conference in Noordwijk in the Netherlands, the official government background document had it wrong, so you have

to be very careful when it comes to just exactly what the greenhouse effect is.

The gases that have this capability of absorbing infra red radiation, starting with the most important gas and working downwards, are water vapour, carbon dioxide, methane, chloro-fluorocarbons, ozone in the lower atmosphere and nitrous oxide. Water vapour is in fact more important than carbon dioxide but this is accounted for in the climate models. When the climate warms for whatever reason, evaporation increases. That leads to more water vapour in the atmosphere. That has a greenhouse-trapping effect that causes further warming.

The increase in water vapour is part of the response, and it is included in the models themselves. So we do not worry about the water vapour itself as a greenhouse gas. We rather worry about the remaining gases that are not included in the climate models, and among those, carbon dioxide is the most important.

What evidence do we have of changes? Bubbles of atmosphere get trapped in snow as it turns to ice in glaciers, in effect giving us samples of the atmosphere as it existed at various times in the past. By measuring the concentration of different gases in these samples of past atmosphere we can see evidence of an increase in methane, carbon dioxide and nitrous oxide over the last 200 to 300 years. As well, starting as recently as 1978 for methane and 1957 for carbon dioxide, we have direct observations of the increase, and between the two we can see a very clear, undeniable increase in the concentration of these heat-absorbing greenhouse gases.

At the same time, our best estimates of global temperature changes indicate that there has been a real warming of the climate over the last 100 years after accounting for changes in instrument type, instrument location and so on. The question immediately arises, is the greenhouse gas increase seen in the previous transparency the cause of the temperature increase seen in this transparency? At the moment we cannot say that it is the cause because, for one thing, there have been temperature changes—warming and cooling naturally over the last several thousand years—at times when greenhouse gases were not increasing. On that basis we cannot single out greenhouse gases as necessarily being the cause of this temperature warming.

On the other hand, we are completely confident—this is based on very fundamental basic science—that an increase in greenhouse gases will cause some warming to some extent. So we are quite confident on the basis of our theoretical

understanding that at least some of this warming should have been due to the greenhouse buildup, but this conclusion is not based on this warming so far being particularly unusual. It is rather based on our confidence in the theory.

Mr D. R. Cooke: There seems to be a huge warming in the northern hemisphere that has occurred in—is that significant and, if so, why?

Dr Harvey: It seems to be significant in the sense that it is not likely to be a measurement error. This reiterates the point made earlier that real climatic change is not likely to be smooth; it is very likely to be jumpy and discontinuous.

If you look at the global record you in fact see cooling from the 1940s to 1960, and in the northern hemisphere from the 1940s to the early 1980s, during which time the greenhouses gases have built up. There is no question that some of this variation is due to things other than the buildup of greenhouse gases and that whatever occurs in the future will be a superimposition of the greenhouse buildup effect plus natural variation. But it is easy to show; it is a back-of-the-envelope calculation to show that for business-as-usual scenarios, if we continue exponential growth in carbon dioxide emissions—the oscillations we see here and farther back in the record which give us some idea of what the natural variability is—oscillations of this magnitude will be swamped by the continued buildup of carbon dioxide and other gases.

A recent report—the George Marshall report, which is scientific baloney and does not in any way represent expert scientific opinion—has argued that this warming could very well have been due to 0.5 per cent increase in the solar constant. First of all, all the direct observations we have of solar variability indicate that the variability in the output of the sun is minuscule. Over the last 10 years we observed a peak-to-peak variation of 0.07 per cent, and that spans a range from the lowest sunspot numbers to the highest sunspot numbers observed at any time during the last 200 years, of 0.07 per cent observed variation. You could argue that at longer time scales the variation could have been larger and that might be true, but it is pure speculation. There are no direct observations to support that.

But even if you take their argument and assume that the solar output increased by 0.5 per cent and is responsible for this warming, that implies a certain minimum response to the heating effect of greenhouse gases. One thing we know for sure is that these greenhouse gases have a heating effect. What we are uncertain about is

how the climate will respond. But you can compare the heating effect of a 0.5 per cent solar constant increase with the heating effect projected for doubling or quadrupling of carbon dioxide, and whatever the climatic response is in either case to those heating effects, it is easy to prove that the heating effect of the carbon dioxide increase will swamp the heating or cooling effect of a 0.5 per cent change in solar constant. Even if there are solar constant changes as large as 0.5 per cent, that does not make this problem go away.

Mr D. R. Cooke: Is there anything taken into consideration in terms of population increases? You have just said that we not only emit infrared but we also emit carbon dioxide.

Dr Harvey: We emit the carbon dioxide which traps infrared radiation.

Mr D. R. Cooke: Yes, but in addition to increased population, you have increased clearing of lands and trees—

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Dr. Harvey: Oh yes. I will come to that.

This transparency compares per capita carbon dioxide emissions. This is tonnes of carbon per person, and we see that Canada is at about 4.2 tonnes of carbon for every man, woman and child per year. Our population, however, is very small. China and India are currently at very low per capita emissions but have very large populations. If they go even to a fraction of our emissions, because their populations are so large, it could have a significant impact.

I have a transparency here—we might want to compare numbers later on—of emissions from Ontario. Electric utilities come in at about 20 per cent, transportation at 28 per cent and industrial direct use 34 per cent.

This illustrates the flows of carbon in billions of tonnes per year due to photosynthesis, respiration of plant matter, decay of soil detritus. There are also huge exchanges in either direction between the atmosphere and the oceans, but this is a system that would be close to balanced in the absence of human activity so that it would be changing very slowly and within fairly constrained limits. The human fluxes are on the order of five to six billion tonnes of carbon a year, which works out to one tonne per person per year, since our global population is about five billion, due to burning of fossil fuels and another one to two billion tonnes due to deforestation. These fluxes are small compared to the absolute natural fluxes, but they are large compared to the

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Vice-Chair: Brown, Michael A. (Algoma-Manitoulin L)
 Callahan, Robert V. (Brampton South L)
 Charlton, Brian A. (Hamilton Mountain NDP)
 Cooke, David R. (Kitchener L)
 Cureatz, Sam L. (Durham East PC)
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 Pollock, Jim (Hastings-Peterborough PC)
 Ray, Michael C. (Windsor-Walkerville L)
Clerk: Decker, Todd

LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Tuesday 27 February 1990

The committee met at 1012 in room 230.

GLOBAL WARMING AND THE GREENHOUSE EFFECT

The Vice-Chair: Good morning. I call the committee to order and would like to tell the committee that I attended the Board of Internal Economy a few weeks ago and that it has approved our budget for both this year and for next, which I think is a precedent of some shape or description, which means we can go on with hiring our consultants which will be, I think, good news to all of us.

This morning what we are attempting to do is to learn something about global warming. Lewis has a presentation for us. I am told that it is to be informal, that we can ask questions as we go along and I am sure that that will be most helpful to the committee. So I will turn it over at this point to Lewis and he can give us a good briefing on global warming.

Mr Yeager: I am not going to try to fill in a lot of factual information that you will be hearing from witnesses over the next couple of weeks, but I would like to hit on some of the basic processes that are going on with the greenhouse effect, and some of the modelling efforts and predictive efforts that have been going on as well, so that you will be familiar with the basic terminology. By the time the witnesses come, in many cases, it will be the second or third time you have been hearing about this and you will have a chance to become a little bit more familiar with it.

Some of it may be a bit intimidating the first time through, so this will be a good chance. If something is not clear in the way I explain things, it often is not, then just ask and we can go through things as often as necessary until you are comfortable with the basic principles of what is going on.

Some aspects of it are very complex, but the basic principles are fairly straightforward and it is not an area where all the questions are answered yet, so almost everybody has a lot of coming up to speed to do.

The basic outline of my presentation: I would like to start with a bit about what the greenhouse effect is and what the processes involved are, a bit of theory, if you will, and then move into the

emissions of the gases that are implicated in this problem. I have been putting together an inventory of greenhouse gases and I have got some of the preliminary findings to discuss with you today. Then I would like to move into the climate observations and predictive modelling, what these models are, what they are trying to do and why there is uncertainty in the modelling process.

During the hearings we will have witnesses coming and some will be a bit sceptical about the modelling results. I would like to sort of give you enough background so that you can take part in the discussions with those witnesses in an informed manner, and I would like to finish off with a bit about the projected effects of the greenhouse effect, both globally and with respect to Ontario.

I am not going to deal extensively with that, because we have witnesses coming in who have more up-to-date information than I have at my command and the same, really, with remedial measures. You will have many witnesses coming who will be suggesting policy options and approaches that might deal with these, so I am going to try to steer clear of that because the presentations in those areas should be fairly straightforward. So I am going to try, basically, to go over some of the scientific background so that you can ask questions. We will leave the policy things until later.

Specifically, what is the greenhouse effect? It is a phrase that is popularly used now to describe increased warming of the earth's surface in the lower atmosphere, which you will hear described by witnesses as the troposphere. It is attributed to increased levels of carbon dioxide and some other atmospheric gases that, like the glass panels of a greenhouse, will let heat in but prevent some of it from getting back out.

There has long been a greenhouse effect. It is a natural phenomenon and is an essential part of the earth's evolution because, without it, the temperature at the earth's surface would be much colder and life would be impossible. The greenhouse effect has always been in place. What we are talking about now is whether the amount of these greenhouse gases is being increased by human activities and that harmful effects might come from an increasing of this

effect or this heat-retaining character of the atmosphere.

What they are basically most afraid of is a rise in temperature of about five degrees centigrade—that is about nine Fahrenheit—as early as the middle of the next century. So that is our rate of change, many times faster than the average rates of natural change that we have had in the past. The climate is always changing in response to solar activity and basically other processes within and without the earth. So change always occurs.

But we are talking here about a potential for a much faster degree of change than we have seen in the past, and therefore much reduced ability of natural systems or even human systems to respond to those changes. That is the background fear that is making this a topical item right now. But there is much uncertainty and even controversy over how much and how fast these temperature changes will occur, and how these changes will alter the accustomed patterns of rainfall, of drought, growing seasons, sea levels and all these types of things. It is not just a gradual increase of temperature that people are most worried about; it is related effects and perhaps widely fluctuating effects. So we are not looking at a gradual change as much as something that might occur in fits and bounds and have unexpected spinoff effects.

Basically this greenhouse effect as a scientific proposition is pretty widely accepted now. The controversies are largely related to the extent and the timing of it. So the grim bit now, some basics on what this is about.

It is not an area of research, this global warming, which is limited to atmospheric scientists like the climatologists, meteorologists, although these are the people you most often hear from. In addition to the atmosphere itself, the oceans and the living part of the world—what we call the biosphere—are also important components of regulating temperature. The atmosphere and the oceans are both fluid systems and they circulate in three dimensions, not just in two dimensions like you see on a map, with cyclonic events and ocean currents. So they are moving up and down as well as around.

So these are all factors that make things complicated. As well as the earth's rotation and the temperature differences from one part of the earth to the other, density differences in the water and the air because of the angle of the sun, there is differential heating on one side of the world then the other every day and seasonally, and just the basic physical geography of the earth. All of

these affect the way in which air and water circulate, and with the circulation they carry both heat and carbon dioxide and the other gases around.

So although we speak of average temperatures, we are all aware that weather and climate are really variable, and it may be quite difficult to differentiate a long-term trend when we are in the midst of ongoing cycles of a climatic change due to fluctuations in the sun's energy and things like that.

1020

You have probably all heard of 11- or 22-year cycles of sunspots and how they apparently affect the weather and things of that nature. Well, certainly there are cycles ongoing all the time. The sun is the prime mover of the earth's climate and the source of the energy, so it gives a lot of possibilities for change. Every time the sun changes even slightly we feel the effects of it. So trying to draw out the greenhouse effect from these other changes is a bit of a challenge and that is probably one of the reasons it has gone somewhat unrecognized for quite a period of time. I remember doing my grade 8 project on the greenhouse effect, so it has been known for some time.

The Vice-Chair: Just a couple of years ago.

Mr Yeager: That was back in 1984.

So it has been around, but it has not caught the public's interest, because it is difficult with all the other things changing at the same time to really discern the types of changes that would happen. It is only now with the increased sensitivity of measuring techniques and computing techniques and the weather observations that we are seeing each year that this is becoming more apparent.

Half of all the solar energy reaches the earth's surface, half does not. I have sent around a little diagram that looks pretty bad and it is worth taking a bit of a look at because it explains what is happening with the energy coming in and going out. On the upper left-hand corner you see incoming solar radiation. That is 100 per cent of the radiation coming in, and if you follow the arrows down on the left you see that absorbed by the surface of the earth is 45 per cent; and reflected by the surface, the little one that is zinging back upward to the right of that, is five per cent.

So the reflection from the earth is not a big part, but you can see the cloud there is absorbing 25 per cent and the atmosphere reflects 25 per cent. On the other side we are looking at outgoing infrared radiation, 70 per cent.

Now the basic greenhouse concept is that light and energy from the sun is coming in on all different wavelengths, different colours of light. You are familiar with the spectrum. There are many nonvisible sources of radiation coming in. But when they heat the earth or they heat clouds or they heat the atmosphere that gives off radiation. That is called infrared radiation, basically heat radiation that is of a very specific type of radiation. That is the one that can be retained by these gases that we are talking about.

So there is a balance, normally, between the amount coming in and going out. But if we increase the amount of these gases, this radiated infrared radiation can be retained in the air. That is where the buildup of heat comes from. Many types of energy come in and the greenhouse gases affect preferentially this infrared or heat radiation that would normally go back out.

So the amount of this radiation emitted by the earth is balanced almost exactly by the amount of solar energy absorbed and this is a state of equilibrium. It is not always exactly the same, but that is why the earth's average temperature changes pretty slowly from year to year. But a few of the trace gases in the atmosphere have this important physical property that keeps the planet warm enough to live on. They absorb this radiant energy at the infrared wavelengths much more effectively than they absorb any other kind of energy. That upsets what would happen if there were no atmosphere. It keeps us warm enough and, as we increase that effect, it builds it up.

Now, what are these greenhouse gases? Well, water vapour is the most important one and its distribution on a global scale has not been much affected by man. So in a sense there is not much discussion about water vapour but that is the one that has the greatest effect. The second most important one you have heard a lot about, and you will hear more, and that is carbon dioxide. That is the one that has been of most significance to climates throughout the history of the earth.

Carbon dioxide is used by plants in photosynthesis and it is stored in plant tissues, and of course the plants eventually break down and accumulate. That is where our fossil fuels come from, basically from deposited plant material from the past. So all of this originally comes from carbon dioxide. There are storehouses, in the earth, of the carbon. These are both inorganic and organic compounds that also dissolved in the oceans and settled to the bottom of the ocean.

So there is a lot of stuff around in various locations.

Carbon dioxide, just to recapitulate, is a long-standing traditional part of the earth's atmosphere. It is extremely necessary to life on earth and basically many of the past climate fluctuations, the ice ages, much warmer periods in the past, all were relatively proportionate to the amount of carbon dioxide that was in the atmosphere at that time.

Methane is another important greenhouse gas that you have probably heard about, and that one has increased by about 100 per cent since the 1800s. This is a simple hydrocarbon. It is produced by the decomposition of organic matter wherever there is little oxygen, and some of the sources of that you probably heard before. They are sort of funny, like the guts of termites and cows and bugs and marshes and rice paddies. These are all big sources, relatively natural sources, of methane. But also garbage dumps and landfills generate a lot of methane and fossil-fuel industries give some off as waste gas. So a little bit later, when I am talking about the inventory of emissions, we will touch on some of these.

One important thing to remember about methane is that it may be 20 to 30 times as effective at absorbing this infrared radiation as carbon dioxide, but it is present at only about 40 per cent. It is important in the atmosphere because there is much less of it. It is, if you want, a stronger greenhouse gas than carbon dioxide but fortunately much less prevalent.

Another group of gases that you have heard of are CFCs or freons, the chlorofluorocarbons that we are aware of in all kinds of industrial applications, air-conditioning, many uses. These are more effective greenhouse gases than even methane, much more so than carbon dioxide, and they have been implicated in the problems with destruction of the ozone layer as well as being a greenhouse gas. They account for about 20 per cent of the new greenhouse effect that we have seen in the last century or so.

Now, you will quite often see that one of these gases is 83 times as effective as the other 40 per cent, more than 20 to 30. These numbers may not be exactly right, because this is something called the radiative equivalence of these gases and our understanding of these is changing because there are many things involved. It is just not a simple, straightforward thing. But the important point for us to consider in the committee is that carbon dioxide is the most prevalent gas and methane and CFCs are the most effective heat-retaining gases. So one is most prevalent, the other two are much stronger but less prevalent.

The interesting thing about CFCs, of course, is that they are entirely artificial and man-made and their uses are all somewhat controllable by our activities. Many of the sources of methane and carbon dioxide, of course, are not.

Just to briefly discuss the emissions of greenhouse gases in Ontario: I have been compiling some preliminary stuff from federal and provincial agencies and I have a little handout here. I am going to be preparing a report on this for you that will organize the stuff a little bit better. This is a lot of relatively raw and draft information at this point. But some of it is worth just considering now. You will have probably better information from the witnesses as they come in and give you the details. But the first graph on the second page after that repeat of the chart that you had before—

1030

Mr Kerrio: I just want to ask a question about how we are going to carry on here. Are we going to wait until we go completely through this or are we free to ask some questions for clarification?

Mr Yeager: Whatever suits you.

Mr Kerrio: I am easy, just whatever you decide.

The Vice-Chair: I suggest you jump in, because it is a big topic.

Mr Kerrio: There are a couple of questions I wanted to raise, before we get too much farther along, from these presentations. I am a little confused and I am sure that could be straightened out here easily.

I just thought it might be appropriate for this committee to have an idea about what kind of exposure people have from the solar radiation in terms of rems so that we might have a little better idea, and other people might as well, about what the numbers are in radiation from some of the reactors. I imagine it varies considerably around the world, but maybe the maximum effect of solar radiation measured in the same type of measurement as we do with reactors will give people a little better idea about what a rem really means. That is just something you might follow up with.

The left side of that is pretty well explained, because I can see that when we look at the numbers and try to make them sort of add up, they do, in fact, reasonably well on the left side. I have a little trouble on the other side just addressing the numbers as to how the 100 per cent of radiated—what would you describe that as?—radiation of some sort relates to the com-

bined 1988 greenhouse effect on the right-hand side.

Mr Yeager: The numbers do not all add up exactly, because a lot of them are approximations. This radiation only refers to heat radiation.

Mr Kerrio: Yes, that is generated from the surface.

Mr Yeager: Generally, some of it is retained in the atmosphere, some is reflected back downwards again and some is basically stored in the oceans and things, which is not really shown on here too much, so the numbers may not add up exactly.

Mr Kerrio: They are just, I suppose, to make comparisons.

Mr Yeager: The important thing, I suppose, is the magnitudes with respect to each other; the width of the bands are comparable across.

Mr Kerrio: I would like another thing, and this might come later. I would like a little bit of an idea of the distances we are talking about here. I heard a comment by one of the space capsule pilots that if you were to reduce the Earth's diameter, scale it down so it was eight feet in diameter, one foot would represent roughly 1,000 miles, because the Earth at the equator is roughly 8,000 miles in diameter, which relates to the circumference, 3.1416 or so. It would indicate that if the Earth is eight feet in diameter on a scale, the atmosphere only reaches three sixteenths of an inch on its surface.

Mr Yeager: Yes, all of these things are happening in a very low area.

Mr Kerrio: I heard that number and I would like to check it before I repeat it. It sounds very interesting that on an eight-foot-diameter Earth, the total atmosphere that protects the Earth, the veil, is only three sixteenths of an inch, to scale.

Mr Yeager: That sounds about right. This is all happening in sort of the bottom 20 kilometres.

Mr Kerrio: What, 10 to 12 miles? What would you say?

Mr Yeager: About that. The atmosphere goes much higher than that, but most of what we think of as the atmosphere, the gases, are in that lower area. There are rarified gases in ionic forms and things, and the magnetic atmosphere goes much higher, but most of it is very close to the ground. Gravity holds it close. Almost all of these heat exchange mechanisms that we have been talking about do occur fairly close to the ground.

Mr Kerrio: There was an interesting assessment of the whole circumstance that the veil surrounding the Earth to protect it is so thin.

Mr Yeager: With respect to your earlier question about natural radiation, I do not have something with me, but I do have a pie diagram that looks at exposure of people to various sorts of natural radiation, whether it is radon, solar or just from the ground around them. I do have that type of information in my office. I could bring it next time.

If we wanted to look at emissions of greenhouse gases by Ontario, there have not been extremely comprehensive inventories yet of all the gases. The best information is on carbon dioxide, because that has been given the priority, and largely in the energy-related sectors. That is where the emphasis has been placed so far, so there is not as complete information as I am sure we will have in a year or so.

The first pie diagram looks at emissions by sector in Ontario. We can see that industry and transportation are roughly a third each; residential, 10 per cent or 11 per cent; commercial, 8 per cent, and utilities, which is Ontario Hydro basically, about 20 per cent. This is fairly broadly distributed among the groups.

The next table is from Environment Canada. It is a little difficult to read because they faxed it to me. This is their emission inventory for all the provinces of Canada of carbon dioxide emissions from various sources. Ontario is roughly down the middle, as you can see. You can look in the various categories throughout and you can basically see where the stuff is coming from. This is the information that was used to compile the types of pie diagrams and the others.

I do not know whether there is any point in going through a lot of it, but you can basically see where the bigger numbers are and where things are concentrated. In my report to you, I will emphasize a bit more this type of thing. But when your witnesses are coming in next week, they will be able to address certain sectors in terms of the production of gases, and certainly when you are looking at potential policy directions, you will be able to target your thinking a bit more, based on this.

The third table is an Ontario estimate. Basically, they have taken the 1987 federal inventory and updated it through certain mathematical manipulations to get this. It is a little easier to read. That is the benefit of it, and it breaks things down a bit more by sector. This is all carbon dioxide, but it does break it out between commercial, industrial, transportation, etc., and you can see where the concentrations are.

Mr McGuigan: What's this on diesel, LDV? Is that long-distance vehicles?

Mr Yeager: Light duty, I believe, and heavy duty. I was looking at that yesterday. That is what I interpreted it to be, heavy trucks versus light trucks.

Mr McGuigan: Heavy duty bulldozers and all that sort of stuff would come in; trains, too, I suppose.

Mr Yeager: Yes.

The next little table is basically an explanation of that previous larger table, just summarizing things by sector to give the percentages in Ontario of the carbon dioxide emissions. Some 20 per cent is electrical generation. Then they list the major CO₂ emitters in order: coal-fired power stations, 31 megatons—this would be annual—iron and steel, 19; pulp and paper, 10; gasoline users, 29, and diesel users, 8.

The next page is just a summary of forecasted emissions of carbon dioxide in the year 2000. These, of course, are based on a lot of assumptions, most of them about electrical generation and how much demand management can achieve and the various sorts of things. Any prediction, of course, has to be taken with a grain of salt, but there is a rise, an increase of 28 megatons, they are talking about—or 17 per cent—by the turn of the century.

There is a table next, a pie chart for Canada, on emissions of CFCs, the freon gases. This is only based on federal data for the whole country, divided by population. This was done by the federal government, but it is not an inventory as much as a division by population of the various provinces. Ontario has apparently about 36 per cent of the CFC uses here and they have equated that with 36 per cent of the emissions, and that is probably fairly fair.

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The last table has a bit on methane emission estimates. This was for 1980. The important thing to note, I guess, is that the landfills are much greater than any of the other emissions that were tabulated. This is not very authoritative, even from the look of it that they sent me, but it shows that one of the possible areas for attack is landfill gas. The others are all much smaller in order of magnitude, with transportation and fuel combustion being the largest methane emitters.

That is a very quick overview. You will have witnesses coming from the Ministry of Energy and the Ministry of the Environment, I believe, and other witnesses who can provide you with a lot more detail on how these things are calculated.

ed, but I thought it would be good just to have a feel for some of the emissions.

Mr Callahan: Let's say it is methane gas in the case of landfills. Does the overall size of the area have any bearing on how quickly and how constantly it emits this type of gas?

Mr Yeager: Yes, the volume does and the areal extent. A lot of the landfills, particularly the older ones, were not very designed or engineered, they were just covered up, and that still happens a lot. Any organic matter that decays in the absence of oxygen is going to form methane, and it is very difficult to collect. You will see now that a lot of it is vented off. There are a couple of examples now where they are using landfill gas for, I believe, electrical generation and heating in England, but a lot of it is missed. It is very difficult with a conventional landfill to get very much of it back. A lot of it just slowly seeps away at very small levels.

Mr Callahan: Which is more detrimental to this whole situation, the allowance of its going off just naturally or burning it off? I would like to know if there is some benefit to burning it off, or if you just wind up with the same amount of problems that you have if you let it seep away.

Mr Yeager: You end up with different problems. Probably overall it would be better to burn it. Methane is a relatively simple molecule. It is not likely to form any complicated toxins or anything like that, but there are contaminants in it in a small amount.

Mr Callahan: If you burn it, do you increase the CO₂ emissions?

Mr Yeager: Yes.

Mr Charlton: Which is a less effective absorber.

Mr Yeager: That is right, and there would be less of it. There is a net loss in the amount of carbon that is available or the amount of effect. Yes, there is CO₂ given off, but it is a less effective gas because it is of a different character. Also, there is a quantitative reduction as well, because other things are formed in the heat, carbon monoxide and things.

Mr McGuigan: I think the answer to that is right in the figures. When you look at transportation and fuel combustion, it is very small as compared to landfills.

Mr Yeager: Yes, but that is just strictly volumes. As well, methane is a much more effective greenhouse gas, so that does magnify it again. Yes, there is a bit of this two-sided coin to it. The difficulty with methane, of course, is

getting it together in one place enough to either burn it or use it. It is a pretty diffuse source.

Mr Pollock: Are you saying that it is best not to go down that particular avenue? I was at an operation right along the Mason-Dixon line in the United States where the person was using methane gas to generate the power for his whole operation.

Mr Yeager: By all means, if it can be done. I think future designs should start to look at ways of ensuring that the gas coming off these can be used, but for the conventional landfills that are sitting all over the place, for one thing, a lot of them are dry inside so there is not much decomposition going on.

Mr Pollock: It would carry over a longer period of time if it were dry inside.

Mr Yeager: Exactly.

Mr Pollock: If it were wet, it would eventually form all the methane gas and that would be it then.

Mr Yeager: Future designs may be able to maximize; the same with manure piles and things like that. In some parts of the world, those are placed in facilities so that they can collect the gas coming off those and it is used. It has not been given much thought here. It may be a relatively small proportion of the emissions that can be captured that way, but that is something to keep in mind. We are talking almost entirely about carbon dioxide through this whole process, but anything that can be done with methane has considerable importance.

Mrs Grier: Is there any agreement on these calculations? I cannot begin to conceive how you calculate all of these various contributions. What kinds of assumptions go into the calculations, and do scientists generally agree that, if not the precise figures, at least the balance that is represented in these tables is accurate?

Mr Yeager: I do not know about these specific ones. My firm did a number of emissions inventories for Environment Canada on other gases. It is usually broken down into two parts, the natural emissions and the man-made emissions. It is done on a geographical grid across Canada based on soil types and vegetation types for the natural emissions, the amount of marshland, the amount of surface standing water, this type of thing. So the natural emissions have been done for a number of things, sulphur and—I do not think they have done a methane one yet, but it is a natural. I think they have funded it. I do not think it is under way.

AFTERNOON SITTING

The committee resumed at 1412.

The Vice-Chair: As I see a quorum, I think we should begin this afternoon's deliberations.

KENNETH HARE

The Chair: I would like to welcome Dr Kenneth Hare before the committee. We certainly enjoyed Dr Hare's last presentation to the committee. He alluded at the time to the greenhouse effect and we are happy that he is back to talk to us today.

Dr Hare: I thank the committee for the invitation to come back. I am on my own ground. When I talk about nuclear reactors, I am acting solely because that is the job that was originally given to me by Mr Kerrio. But when I talk about the greenhouse effect, I am talking about the field that I have worked in since I was a boy. It has been my abiding first interest, the behaviour of the atmosphere.

If I might just be personal for one second, I boast about the fact that I have been a meteorologist since I was aged four in that that was when I first began to watch the weather. By the time I was eight, I was publishing my standard climatological observations from my backyard. So I have had my eye on the weather for a long time.

To put it into perspective, I am old enough to be able to say to the committee that the population of the world has more than doubled since I started out and that the climate has gone through most of the warming that the greenhouse effect talks about mostly concentrated in the years of my lifetime. So I think I can be said to be coeval with the greenhouse effect.

I have with me a whole bunch of slides, but I thought it might be more constructive if I did not use them because they are the sorts of slides that other witnesses will be using. I thought perhaps it might be more useful if I said just a few words about my own perspective on this question and then let the committee fire questions at me. Would that be in accordance with the wishes of the committee?

The Vice-Chair: I believe it would be.

Dr Hare: First of all, my own feeling about this is that this problem that we are discussing, the greenhouse effect and the global warming, is real, is not going to go away, is going to accelerate and, of course, is surrounded by the usual cloud of uncertainty that any forecast of the future is surrounded with.

I would like to begin with a remark that I made on the floor of this room to the committee before. It is that I think that although there are many uncertainties attached to this question, they are probably less than the uncertainties with which you are all faced professionally in matters of socioeconomic policy. I have always thought politics was the art of making wise decisions in the presence of complete confusion as far as the evidence is concerned. I think you are up against this all the time, so I am not going to apologize for the fact that there is uncertainty about this. There is less uncertainty about this than there is about economic issues. That is the first categorical statement I will make. I was on the board of an economic forecasting outfit for 12 years and I know whereof I speak. I could have made a better forecast of the future climate than they were making of the future state of the economy, and yet economic policy has to be long-term.

Mr D. R. Cooke: That is not saying much.

Dr Hare: No sir, it does not say anything. What I am saying is, have mercy on me. Do not accuse me of being uncertain. I admit the uncertainty, but I think it is not bad. I think it is a better statement in many ways than I could have made on socioeconomic grounds.

Second, I think I would like to say that you have picked an excellent bunch of witnesses. You have coming up in front of you two or three of the people who are most qualified to speak about this subject. Phil Jones, who is on your list for Thursday at 11 o'clock, is from the University of East Anglia. I am on the advisory board of that institution and Phil Jones is the man who has led the international effort to plot the temperature distribution over the past century. Nobody can tell you more than he can about how temperature actually has varied, and what he will tell you will include the fact that the 1980s have seen a sudden upward acceleration of temperature that has refocused attention on the greenhouse effect. He is not, of course, certain that it is the greenhouse effect that is producing this warming, but the 1980s have been so warm that everybody has been talking about it, everybody has had his eyes focused upon it.

When I learned that Mrs Thatcher had actually ordained that there should be created an institute for the study of climatic change, the International Institute for the Study of Climatic Change, on British soil, I knew that the revolution had indeed

come because Mrs Thatcher was easily the most difficult person to persuade about environmental issues up to the 1980s. But the warmth of the 1980s achieved it.

A third point I would like to make is to stress the political difficulty that I, as an amateur, think you would be confronted with. The first thing is that although I believe the greenhouse warming will continue and be accelerated, it will do so unequally between jurisdictions. It will not be possible, unless I am very much mistaken, for the professional forecasters to tell you which regions will be hit most and which regions will be largely spared. That means that provincial governments will be unequally affected, and that makes life very difficult for a provincial legislator. I cannot tell you for sure what will happen in Ontario. I think I can tell you what will probably happen on the Canadian scale, but as to how that will be distributed within Canada, I do not think our modelling skills are yet up to that task, although all the effort is now being put on overcoming this problem.

So there is my third point, that there will be inequalities between the provinces and that it is impossible at the moment to predict what those will be. I would add that the same applies internationally. I think the evidence is that the effect will be a maximum in high latitudes and a minimum in low latitudes, but I am also sure that it will be unequal. My own view is that those inequalities will not be removed by the scientific efforts now being made. We shall still be uncertain about which countries will be most affected, just as within Canada we shall be uncertain as to which provinces will be most affected.

A fourth point I would make is that the measures that should be taken in order to control this effect may be outside the reach of any Canadian jurisdiction. It is an international problem. If indeed it is true that the consumption of fossil fuel accounts for half of the greenhouse effect, and I think it does, then it is clear that bringing the fossil fuel consumption question under control in Canada will not solve the problem as regards China, India, the Soviet Union or the other countries that sit on very large reserves of poor-quality coal and have no other obvious ways to go ahead with their own renewed industrial revolution.

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Therefore, I personally feel that it is just as important for this country to have a foreign policy which is rational in relation to this problem as it is to think about what it should do

internally. Although I know that is a federal matter and not a provincial matter, I think it is important that everyone understand that our foreign policy ought to be aimed at influencing the conduct of other jurisdictions and working towards international accord in this area. Without it, quite frankly, what we do internally is likely to be ineffective.

The fifth point I would like to make is the unpopular one that we have to continue the research effort that is now in progress. I know very well that research is a never-ending bucket into which you can pour money and I do not blame legislators for feeling uneasy about being assured of the need for more research. But I would say actually that the research effort in this field, and you will hear about it from some of the best people in the world on this list, seems to me still to be absolutely minute by comparison with the scale of the problem.

I was at a meeting recently of modellers, people competent to study this question from the point of view of the atmosphere and ocean. They estimated that there are 200 qualified modellers in the world. They work in a maximum of 14 centres, that is all; and so far from the number increasing or the size of the qualified labour force increasing, if anything it is being diminished. For example, one of the places was Oregon State University, where my daughter teaches; fortunately not in this field. I say "fortunately" because they just closed down their modelling effort in this field on the grounds that they could not afford it. It is very expensive. I do not blame Oregon's Legislature for going along with this. It was in fact red-lined in the state budget, but the fact is that this was one of the best places in the world to study it and we have just closed it down and the modellers have been dispersed to other centres.

In this country the efforts of this kind are concentrated in just a few places. There are very competent people at the University of Toronto, at McGill University, at the University of Quebec in Montreal, but there is really only one place in which you can undertake this kind of research and that is at the atmospheric environment service here in Downsview. What we have to do in this country is to arrange a network such that everybody who is competent to work in this field can work in connection with the effort being undertaken in Downsview. You have Kirk Dawson, who is the director general of the Canada Climate Centre, on your list for Tuesday 6 March, so you can ask him whether that is being effectively done.

I would like to make it clear that the need to intensify research conducted in this area is not simply a question of providing funds. It will take many years to increase the number of people competent to do this because this is one of the most complicated jobs that the scientific world has to offer and it is not possible to switch it on overnight. It has to be done years ahead to get real results.

A final point I would like to make is that it is clear that the importance of this subject derives from its social and economic implications. I am a pure scientist in the sense that even if there is no impact on human society, I would still be fascinated by what is going on. But it is because it is beginning to touch society that it has become of importance to people like yourselves and to the public generally and has become front-page news. This means we have to look at the whole question of the impact of climatic change on the human economy, on natural ecosystems, on agriculture, particularly and on the energy policy.

I have with me the Ontario Hydro task force report on the greenhouse effect. This is one of dozens of such reports which are coming into my office now, showing that everyone knows this is the case. Nevertheless, I should like to emphasize that it is a new problem; from the point of view of the world's economists and political scientists, it is a new consideration. You will be hearing from Bill Fife, on your list, about the global change program. The global change program is an effort by the international scientific community to come to grips with the broader aspects of this question.

I have just finished a term as chairman of the Canadian global change program, and we are unique among the world's nations in recognizing that this is a socioeconomic problem as well as a physical or natural problem. We have in place in this country the beginnings of an organization that will look at the question of global change from both the socioeconomic and the natural science perspectives. The board that I recently chaired does indeed represent those two thrusts very effectively. The new chairperson is the head of social programs from the International Development Research Centre, Anne Whyte. So the scientific and academic community has made a beginning at doing what needs to be done in this area and to extend it into the socioeconomic area.

I would like to say, in closing my opening remarks, that this has sort of burst on the world so quickly that if you go back three years you are almost at the start of the sort of broadening that

has gone on. I am going to Budapest in six weeks' time to present a paper on this subject to a world conference. There are 40 references in the paper that I have written, which is a review of the present state of the art; 36 out of the 40 had the date 1989 on them, meaning that I did not think it was necessary to refer very much to what happened before 1989. This committee is almost in on the ground floor, I think, of a major change in the way we approach energy policy.

Thank you, Mr Chairman. That is enough for an introduction.

The Vice-Chair: Thank you, Dr Hare. I suspect that some of the members have questions.

Mrs Grier: I guess I would like to hear some more. Your paper on the state of the art, can you encapsulate that for us?

Dr Hare: Yes, perhaps I can do that. I can do better: I will provide copies, if I may, as soon as they are typed. They are not typed yet. I will provide a copy for every member of the committee.

The Vice-Chair: I think we would very much appreciate that.

Dr Hare: It is a state-of-the-art paper. It is right up to date. Of the four references that are not 1989, two are 1990. Anyway, what I have said in this is that first of all the empirical evidence of climatic change, that the climate is actually changing, is getting clearer and clearer all the time. I based myself largely on Philip Jones's work. Philip Jones is the East Anglian official who is on your list and who is charged with the job of internationally co-ordinating the incoming temperature data. He can now tell you on about 10 January what the mean temperature for the whole world was in 1989. That is where I get that from. But in sum, the mean temperature of the earth's surface in 1989 was 15.6 degrees. That makes it the fourth-warmest year in the last 10,000. The temperature the year before was 15.6 and the year before that 15.5. When I was an undergraduate, it was 14.7. That gives you some perspective on the change. You may think these temperature changes are quite small, but that is not the case. When we are talking about anything as big as the world, we are talking about huge changes, and these are very big changes.

There is every evidence that this rise is continuing. It appears to be affecting the sea surface. We have now got one-degree-square measurements of sea temperature continuously from satellites. They have not been in orbit long enough for us to be sure about this, but it does

look as if the ocean surface is also warming up as a whole at about the same rate, perhaps a little faster than the atmosphere.

There is as yet no evidence of a change in rainfall over the continents, but we think it must happen as the ocean surface warms, because that creates more evaporation. There ought to be an increase in precipitation one of these days, very unequally. We have now, for the first time, got evidence on what is happening to the world's glaciers that is quantitative and direct. Within the last month, the Americans have published the radar altimeter data on the surface of Greenland south of latitude 78 degrees, and I think from memory I can say that the Greenland ice has risen by 25 centimetres in the last eight years, the central ice, meaning that the centre of the ice is in fact growing, taking water out of the ocean, being deposited on the ice. We expected this. What we do not have is an accurate measure of what is happening around the margins, where we expect there to be melting.

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Within the last 10 years, we have also begun to get data that tell us what the cloud systems do. You will hear from the critics, and you will read in the papers that I am sure you are getting thrown at you, that the reason why the models do not work properly is that we do not know how to put clouds into them. Within the last year, there are now four published international model's results in which the clouds are introduced properly, that is to say reactively, and we have begun to analyse the earth radiation budget experiment data, which are coming back from actually three satellites in orbit. They show that the net effect of the cloud systems is slowly to cool the earth. However, the effect is sufficiently large that in order for forecasts of the warming to be correct, we have to be right about clouds far more than we are at the present time. That is to say, we have to improve our information about cloud systems.

That is more or less what we have learned in the last year. One last point: we have now got, within the last 12 months, models that incorporate the ocean in motion; that is to say, that allow us to include the ocean as well as the atmosphere in our models. One of these, from Princeton, predicts two things that we had been anticipating and I think we are beginning to see in the observational data; namely, a change in the way in which the ocean carries heat towards the pole, as it must do, which we have not before been able to incorporate. We have also been able to make the first estimates of the rate at which the very cold water at the bottom of the ocean is

reinforced. These are essential to getting good model results.

All this is the work of the last 12 months, and I am very encouraged by it, because it directly answers some of the critical questions that, for example, the George C. Marshall Institute raises. I accuse the authors of the Marshall Institute report of not reading the literature.

Mrs Grier: Good. When we come to what can be done about it, given the global nature of the problem, which we have come to understand already, can you comment on the suggested reduction of 20 per cent and the applicability of that to a jurisdiction such as Canada or such as Ontario?

Dr Hare: Well, 20 per cent below 1988 levels is 46 per cent in the year 2005; in other words, 46 per cent below expected consumption in the year 2005.

Mrs Grier: Assuming we continue at the same levels.

Dr Hare: Yes. The sums are done very nicely by the Ontario Hydro technical report. I do not know whether the committee has access to this report.

Mrs Grier: We have access to it. I do not think we have seen it. We may have got it in another capacity.

Dr Hare: It is by Carol Burnham's group in Ontario Hydro. She is the lady who used to run their fusion enterprise and she now runs the greenhouse effect. Anyway, the figures are in here.

Speaking from memory, to get fuel consumption down to 46 per cent, you would obviously have to produce energy from some other source at 54 per cent the present levels if you want to balance the budget and keep energy consumption at the same per capita level. I do not know where that would come from. Clearly, the capacity to increase electric supplies from nuclear reactors is there if the world wishes to make that choice, but my bet is that it will not wish to make that choice.

I arrive, from that figure, with the quite certain conclusion that the central problem is really not what goes on in our power stations, it is what goes on on the roads, because it is the automobile, the diesel locomotive, the essential role that the mobile hydrocarbons make on this problem that is, to me, the largest single issue.

I can see us conceivably finding some other way of converting electricity centrals out of the fossil fuels or out of the very carbon-rich fossil fuels; for example, some increase in the use of natural gas in electricity generation, better-

quality coal, more efficient combustion. I can see that sort of thing happening, but the sums that I have read in this report and others that I have read suggest to me that the very best we can do with our electric supply is to hold the line, if electricity consumption increases, as I expect it to do, on a world basis.

My own view is that the central question is getting out of hydrocarbons for mobile transport, and that has been the question for a long time. I mean, I drove here and I bet some of you did too, and I am not going to apologize for that fact, because what else can you do? The way Toronto is built—I was lecturing at York University until one o'clock today, and how I could get from York to here in—I could not do it. So you are sort of stuck with it.

Nevertheless, I think we might as well face it that the hydrocarbons are going to have to be phased down, and indeed they will phase themselves down in due course. The oil and natural gas supply is limited. But if that means we have to look for some other means of locomotion, I do not know what that means is.

I am taking part next week in Premier Vander Zalm's conference on hydrogen economy, and I hear a lot of people telling me, "It's quite simple. The ultimate hydrocarbon is hydrogen. Just take the carbon out." But of course there is not any carbon in hydrogen in nature, you have to break the bonds up in water, and that involves consuming energy, so it is not a solution. It is a better way of carrying the energy around with you in the trunk of your car, but it still does not solve the problem.

So that is my first conclusion on your question, that we have got to do something about transport is the central question.

The second point that you make is, what about our relationship to the other countries? As I said in my opening remarks, our contribution to this per capita is very high. We are very high consumers of all the hydrocarbons, per head, including coal, and that makes us guilty on a per capita basis. On the other hand, by comparison with the potential of China and India to influence this question, we are simply bit-part players.

China, and I know quite a few Chinese scientists, is fully aware of this question, but I am quite certain that her government is completely committed to industrializing as fast as it can. I do not see any other source for that industrialization, given their situation, than the use of domestic coal supplies. So I think everything really hinges on what the Chinese do.

The Indians are in a slightly better position, but not fundamentally. They do not have the means of doing without the hydrocarbons, and I am sure they will go ahead and use them. It also looks to me as if the economy of eastern Europe and the Soviet Union, which is now in serious travail—they are not going to be in the position to move quickly towards more efficient energy consumption patterns than their political system will permit, and as you know, it is in disarray.

So I think we are bit players, and Ontario is perhaps the largest and in some ways the most fortunate of the bit players, but we are bit players on the world scene. That is why I think we should really concentrate much of our attention on influencing foreign policy and on trying to work towards international accord as to how to handle this question. This is, I realize, not your jurisdiction.

Mr McGuigan: Dr Hare, Dr Harvey this morning also mentioned other scientists. One was Marshall. I wonder if you could tell us a little more. It is a new name, I think; at least to me, perhaps not to other people.

Dr Hare: Was he referring to the Marshall Institute?

Mr McGuigan: Yes. Dr Harvey mentioned it and you mentioned it. I just wondered if you could tell us a little more about it.

Dr Hare: George C. Marshall, General Marshall, of the Marshall Plan, the commanding officer of the US armed forces in the latter years of the war, and then later on I think the most imaginative Secretary of State the Americans have ever had. There is an institute in Washington created in his memory which has become a sort of right-wing think tank. It has a lot of money and it sponsored the work of three men on this question, who have come in with a statement that the greenhouse effect is much exaggerated. They do not deny its reality, but they say it is much exaggerated; there are far too many uncertainties to justify public policy action at the present moment.

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I can tell you who these men are and you can judge for yourselves. The chairman of the group was Bill Nierenberg, who for many years was the director of the Scripps Institution of Oceanography at La Jolla. The importance of that fact is that it was the Scripps Institution of Oceanography at La Jolla that started the consciousness of the greenhouse effect problem back in the 1950s. It was that institute that started the measurements of carbon dioxide on the upper slopes of Mauna

Loa in the big island of Hawaii, and Roger Revelle, then of the institute, who first persuaded the White House that the greenhouse effect was something to be studied. Nierenberg is the present director. He is Revelle's successor.

Nierenberg is, I suppose, in crude terms, right-wing. These terms no longer mean very much, but he is a personal friend of Ronald Reagan. He likes to go hunting and shooting; he is a swashbuckling character.

He is a friend of mine. I am very fond of Bill Nierenberg. I was the chairman of the Canadian peer review panel on the acid rain negotiations with the Americans and he was the American chairman of the American panel, so I saw a great deal of him over those years. But Bill will always come up with a more conservative estimate than most other people. I mean, temperamentally, that is it. If you have a choice, and these things are to a large extent a matter of opinion, he will make the conservative choice. That is the way he is built.

Bob Jastrow, the second member of the group, was the man who founded the Goddard Institute for Space Studies in New York, which is a US federal agency. The paradox is that the man who started the rumpus two years ago, Jim Hansen, works for the Goddard Institute for Space Studies and in fact set up the modelling lab in that institute. I think Bob Jastrow actually hired Hansen in the first place. What Jastrow is saying is that Hansen is wrong and exaggerating the problem.

The third man was Frederick Seitz, who is a medical scientist who was head of Rockefeller University and the president of the National Academy of Sciences a few years ago.

All three of these men have world reputations in their fields. Only Nierenberg is, in his scientific work, at all close to this question, and the criticisms that are made of it is that they really do not know much about it, that they are using their eminence as scientists to counsel the American government.

I regard their activities as completely legitimate, and I also think they are wrong. You can be wrong. Science is not a certain business at all. It is a question of picking your scientist.

Mr Charlton: Dr Hare, can we go back for a minute to some of the questions that Mrs Grier asked you and comments you made in response? You made reference a few minutes ago to the acid rain negotiations with the US. You pointed out, I think quite clearly, that in the context of this whole question of global warming, what happens in Canada and what happens in Ontario is of little

consequence. If we were to proceed to significantly cut emissions here without international agreement and international movement in the same direction, there would be very little impact.

You talked about a role for us to play in encouraging those international agreements. I recall very much the same debate a decade ago around the acid rain question. I remember 1978, 1979 and 1980 here in the House, for example, when we were trying to determine whether we should proceed on our own with specific programs here in Ontario in the absence of an agreement with the United States.

In your opinion, would it be fair to say that one of the best contributions we could make in Ontario to our federal colleagues and their ability to perhaps have some influence on the international scene would be both in terms of research and development here in Ontario and examples in terms of cost-effective implementation of reductions? Is that a useful role for us to target in Ontario, even in the absence of those agreements, as part of promoting those agreements down the road?

Dr Hare: That is exactly what I hope the Ontario government will have a mind to do. I think it is exactly right. There are several things supporting this.

First of all, Ontario is in some ways uniquely placed in that it has all these energy modes in use in its own jurisdiction. Ontario Hydro has major coal-fired plants. It has major nuclear plants. It has, actually, an excellent research staff; this work is a demonstration of it. So you start off with a single energy utility that can in fact be directed in this direction. Unless I am misunderstanding his views, that is what Bob Franklin says about Hydro too.

Second, I think we have the leeway in Ontario that some other places do not have to take imaginative steps.

Third, it happens that the research capability in this field is largely concentrated in Ontario in this country. It is true that it is at the moment federal in its jurisdiction. I would love to see the province get into that. I am sorry that the centres of excellence program did not yet throw up a centre of excellence in this area. I think it should have done.

So, yes, I entirely agree that this is something that the province can do.

You use the term "cost-effective." I am very much of a conservationist. It seems to me that economic policy always ought to work towards the cost-effective use of natural resources and the cost-effective use of human labour, as long as the

term "cost-effective" is interpreted on a sufficiently long time scale. We are talking here about things which will grow and affect subsequent generations. It seems to me, therefore, that a measure may be cost-effective if you take a 15- to 20-year or 30-year prospective. It will never be cost-effective on the basis in which accountants normally reckon that term.

Mr Charlton: That is a fair comment. My comment about cost-effective was made in the context of the present debates that are going on around energy and energy efficiency and whether you are talking cost-effective in 1989 or 1990 or whether you are talking cost-effective in Hydro's 25-year energy approach or plan, if you like. That is the context in which I made the comment. That is an important point to make, though.

Dr Hare: To re-emphasize it, may I point out that the capital budgets of an outfit like Ontario Hydro—and indeed there is no outfit like Ontario Hydro. Obviously, any outfit that works on annual revenues of something like \$6 billion is taking capital decisions that will be most effective 10 or 15 years downstream. It is nothing new, in other words, for them to have to take a long-term view. They do it already.

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Mr Charlton: Thank you. I seriously hope that, with support of people like yourself, we can avoid the five or six years of wasted time debating whether or not we can proceed on our own here and, perhaps five, six or seven years from now, have some concrete examples to hand the rest of the world in terms of successes at getting at the question.

Mr Callahan: Was it also the Marshall Institute that recently indicated that the acid rain problem was not really having the impact that Canada had indicated it was having; that actually a large degree of the acid rain was just natural; that it was not caused by CO₂ emissions from industry and so on? I heard this on the CBC just recently.

Dr Hare: I do not think it was the Marshall Institute. There are a great many think tanks in Washington, of every persuasion, so it was probably another one of the right-wing think tanks that said that. I dislike using the terms "left" and "right" because I entirely agree with my colleague Bob Paehlke at Trent University that environmental questions are neither right nor left. All of us have to face them and they are in everybody's interest.

But there is no denying that the Washington think tanks include a number, like the American

Enterprise Institute and Forbes magazine, for example, whose proprietor has just died, that spend a great deal of money on trying to demonstrate that things like the acid rain question and the greenhouse question are of little consequence. Forbes magazine had an article about two months ago which said that the Americans were about to be led down the garden path by the environmentalists into making a disastrous environmental mistake. Did you see it?

I do not have the energy to write a letter to Forbes; in any case, they never publish anything I say. But my answer to that is quite simply that if it is genuinely cost-effective—Mr Charlton's point—you are not going to lose money by doing these things; you are ultimately going to make money by doing these things. I cannot understand why a five-year decision should seem to be in anybody's good business interests.

Mr Callahan: The other question is, and I tried to ask this of the gentleman this morning, we are told that before we all got here and started causing these problems, assuming we did cause them, there was a natural balance in nature. How much investigation has there been done into things contributing to this problems: wars, where tremendous amounts of energy are unleashed in terms of bombs, bullets, shells, anything that explodes; also the question of just natural increase in population, because we all emit a certain degree of carbon dioxide, I guess, to stay alive; the improvident harvesting of trees, decimation of trees, so that there is not this great number of them through which this carbon dioxide can be returned, I guess through photosynthesis, to something that is worth while?

It seems to me there is a whole host of problems out there that may be totally the cause of this as opposed to centring in on such things as—I am playing devil's advocate, I guess—the question of the use of fossil fuels. We seem to zero in on the use of fossil fuels because that is something we can put a handle on. It is a singular cause, whereas it may be a whole host of causes such as I have discussed and many more that I have not even thought of. Is that heresy or has that been looked at and dismissed? Is that part of the thinking?

Dr Hare: The devil needs his advocates and we all need the devil's advocates. If you do not challenge scientific orthodoxy, it goes off the rails. The fact of the matter is that science is not a certain business; it needs to be challenged. That is why I say I welcome Bill Nierenberg and his challenges, because people listen to him and it is important. I still think he was wrong about that,

but it is important to ask those questions, it is important to ask the questions you are asking.

A lot of work has been done on this in a lot of places—not nearly enough, I would say, but a lot of work—for example, on the question of the relative size of the human economy, wars and natural photosynthesis. Let's take those in that order.

I think in terms of watts. The human economy works at a rate of 10 trillion watts. All human activity is on that scale, about 10 trillion watts. The atmosphere, the wind systems, the storm systems, work at the rate of about 145 trillion watts in round figures, something like 10 times as much as the human economy. Those are in energy terms. We are still pretty puny by comparison with the natural wind systems.

Wars: I do not think anyone has actually done this sum, but I would be prepared to bet that in spite of all the bangs and all the wounded and all the deaths wars have produced, this is still small by comparison with the everyday work of the human species, which is in turn small by comparison with the energy of natural systems. We are still, as I said, pretty puny in that sense.

In parentheses, I would like to ask the committee whether it can answer me the unanswerable question: Why should it be that the manufacturer of bombs and shells contributes to gross national product when they are not likely ever to be exploded, or that if you then have to dismantle the work, that also contributes to gross national product? To me, the economics of the arms industry are absolutely insane. That is in parentheses.

Finally, if you take natural photosynthesis, nobody knows precisely what it is, but it is usual for people, such as George Woodwell at Woods Hole, who have worked on this to say that the rate of photosynthesis is approximately 60 billion tonnes of carbon per annum taken out of the atmosphere. The human being is adding six billion tonnes to the atmosphere. Natural respiration is returning the 60 billion that are photosynthesized. Again, nature works 10 times as hard as we do; in other words, it uses 10 times as much carbon as we do.

You may think that would be trivial. The point is, however, that in nature they are in balance and what we are doing is throwing the balance out. All of this, everything we are talking about, is a question of unbalancing an equilibrium. If you take the greenhouse effect, for example, the greenhouse effect is a good thing. It makes the world habitable. The greenhouse effect raises the temperature of the earth from minus 18 Celsius to

plus 15 Celsius. If it were not for the greenhouse effect, the world would be at minus 18 and we would not be here, because life would not exist. As it is, it is plus 15 and that is because of the greenhouse effect.

It is the added greenhouse effect that is the problem, because we are upsetting the equilibrium, raising the temperature. The earth is used to being actually 14.7, and we have raised it to 15.6. That produces all kinds of consequences. It is the upsetting of the equilibrium that is the key issue here, not the absolute magnitude of the thing. I do not know if I make myself clear, Mr Callahan. It is a very difficult question.

Mrs Grier: I want to get back to Ontario's contribution. I appreciate your comment that we have an opportunity to be leaders in this. Can you comment on the recommendations from the changing atmosphere conference, in June 1988, which was the 20 per cent reduction, as opposed to a phrase that I had not heard until this morning, "stabilizing the concentrations"? Maybe you can explain to me the differences in those and tell us which direction you think is preferable.

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Dr Hare: I do not think we can be sure about this, but let me make an attempt at it. In the first place, that 20 per cent figure has no special magic attached to it. It is a figure pulled out of the air by a bunch of overworked people at the end of a week of hard labour. I was there and I was the person who introduced the greenhouse subject on the floor of that conference, but I was not a member of the working group because, to be quite frank, I am not good at working groups.

They produced this figure on the principle not that it would stabilize the situation, but that it might be feasible. The economists around the table were people from the Third World. This was an international conference and at the end of the day we thought it was just conceivable that we might manage to get 20 per cent reduction below 1988 levels early in the next century. But anything below that just horrified everybody in the room, not because of the scientific point, but because of the sacrifices it would actually imply for the advanced countries. That was the main problem. So my comment is that the 20 per cent figure was intended to be a goad to stimulate people into action rather than a means of stabilizing the concentration of the greenhouse gases in the atmosphere.

The second point I would make is that the conference unfortunately did not say very much about the other greenhouse gases. We assumed that the Montreal protocol concerning the freons

residual and we are perturbing what would otherwise be a closely balanced system.

This transparency compares the amount of carbon in the atmosphere, which is 720 billion tonnes, versus the amount of carbon in what is estimated to be ultimately economically recoverable fossil fuel resources. The bottom line is that the amount of carbon that we could potentially put into the atmosphere by burning of fossil fuels is six to 20 times as much as we have now. Initially only about half of that would stay, but we are still talking about anywhere from three to 10 times the present carbon dioxide concentration. This has to be kept in mind because almost all of the talk that has been in the scientific community and in the media concerning the effects of a carbon dioxide increase has been looking at the effect of carbon dioxide doubling. If we do not begin putting on the brakes soon it is easy to show that we are going to shoot beyond a carbon dioxide doubling, and if we do not put the brakes on at all, if we just use up the resources, we are talking about changes far beyond a carbon dioxide doubling.

Even if the computed climatic response to carbon dioxide doubling is cut in half, if the real world is half what the models are predicting, that does not make the problem go away. It just delays it because, in the absence of policies to limit carbon dioxide, we will eventually reach three, four, perhaps five times and when you add in the other trace gasses we are talking about even larger effective increases. So this is, I think, a very important point and a lot of the conclusions that politically motivated scientists, the George C Marshall people for example, have been making, assume that things will magically stop increasing once carbon dioxide doubles. So we should not focus on what could be just one point on the continuum.

This shows just conventional wisdom, conventional energy analysis which implies emissions of carbon dioxide increasing from the current five billion tonnes a year to anywhere from 20, from middle of the road, to 90 billion tonnes a year. This is inconceivable to me. This is such an astronomical rate of increase in the use of coal primarily, but this is conventional energy wisdom. So we are talking about enormous potential for emission increases.

At this point I should, for the sake of clarity, indicate there are three distinct problems or steps that we have to distinguish. One is the question of economic scenarios and emissions scenarios. This is a result of economic modelling and there is huge uncertainty in the economic modelling as

large or larger than any of the climate modelling uncertainty.

But once you have a scenario of carbon dioxide emission—the rate at which we are putting it into the atmosphere—we have to then run this emission through a model of the carbon cycle. That is, you have to then model what is in this picture, okay? That will give you a scenario of carbon dioxide concentration in the atmosphere. Once you have a scenario of carbon dioxide concentration, that then has to be used as input to a climate model to compute the climatic response. So we have three distinct steps: we have the economic modelling, the carbon cycle modelling and then the climate modelling.

I have been looking for some of the testimony presented to our federal counterpart in the federal standing committee which is looking at the same issue, and I am seeing a lot of confusion concerning the sources of uncertainty in future climatic change. Some of that uncertainty is economic uncertainty, some of it is carbon cycle uncertainty.

Ideally, once you have the climate model response, the temperature response, the climatic response will of course affect the carbon cycle because it will affect the rate at which oceans absorb carbon dioxide—the rate of respiration, the rate of photosynthesis—and you can see that small perturbations in these fluxes, even a one per cent change or 10 per cent change in the respiration flux due to feedback from the climatic change, could then amplify or dampen, depending which way it goes, the human fluxes. So we have a potential for significant amplification or damping. If higher CO₂ stimulates more photosynthesis, that is going to increase this flux coming out of the atmosphere. I think there is a lot of evidence to indicate that one to two billion tonnes of what we are putting into the atmosphere is perhaps already coming out due to stimulated, enhanced photosynthesis.

But at the same time, increased temperature will enhance the rate of decay of this enormous amount of carbon in the soil. Notice we have got 1,200 billion tonnes of carbon in the soil, sitting there slowly decaying, with only 550 billion tonnes in the plants. So there is a potential for a very strong feedback, which in this case would amplify the problem.

We have a number of distinct steps and then we have feedbacks and, of course, the climatic warming could feed back on the economic scenarios as well. So in fact, all three of these modelling exercises ideally should have loops

and interactions between them, but we have not reached that stage yet.

I want to concentrate now on the last of these three steps; that is, given an emission scenario and given a concentration scenario, what are the anticipated climatic changes? Well, you should keep in mind that we already have a greenhouse effect. If it were not for the greenhouse gases already in the atmosphere, the earth would probably be uninhabitable because it would be some 34 degrees centigrade colder than it is now. So what we are projecting is an increase in an already existing greenhouse effect because we are increasing the concentrations of greenhouse gases that are already there. We are just putting them there in greater quantity.

As I said, most of the work has focused on this one particular point in a continuum, namely, a two times CO₂ level and furthermore, has looked at what would happen if we were to increase carbon dioxide, double it, and then hold it at that two-times level and wait long enough for the climate to adjust to it. This is what is called the equilibrium response. Now, in reality, the CO₂ does not suddenly increase and then stay constant. It is gradually increasing and it might shoot way beyond the two-times level, and at any given time the climatic response will be lagging behind the equilibrium response for the concurrent CO₂ concentrations.

So this is an idealistic, simplified sort of yardstick approach. We hypothetically double it, hold it constant and then let the climate model settle into it, come into balance with it.

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Mrs Grier: I did not catch that. Could I just ask, could you calculate the time frame within which this equilibrium would be reached?

Dr Harvey: No, this is not part of the problem. I mean, that is another issue. Most of the work has ignored that question and said let's just look at what the equilibrium response would be.

Mrs Grier: Assuming an immediate equilibrium?

Dr Harvey: No, just waiting for the model to come into equilibrium. In fact, since it is very expensive to run these models, what they try to do is artificially force the model to get to the new equilibrium as quickly as possible. So the focus of most of the studies, the overwhelming work that has been done so far, has been on the equilibrium response. Now how long, in reality, it would take to reach that is another issue.

For now, let me just focus on this equilibrium issue. With CO₂ continuously increasing, and the climatic warming lagging behind it, at some point the climate warming would correspond to this simplified idealistic case. But this is an important question. When would we have the climatic response equivalent to a straight CO₂ doubling? That could happen by the middle of the next century; that is some time around there, for business-as-usual scenarios.

If you look at just the climatic record over the last 100 years and assume that all of this is due to the greenhouse warming, that implies that the response for a doubling should be 1 to 2 degrees. Our previous speaker talked about the need to calibrate and verify models. Oh, let me at this point just make a comment.

The problem of predicting climatic change and the problem of predicting weather are completely different problems even though we use the same models for both. People might say, "How can we believe climatic predictions 50 years into the future when we cannot even predict the weather for tomorrow or next week?" The answer to that is that when we are predicting climate, we are trying to predict the statistics. We are trying to predict the average temperatures, the average rainfall in a season and so on, whereas in the case of weather, we are concerned with the details: What is going to happen tomorrow at a specific place? That is a much harder problem.

It is analogous to trying to predict where the Toronto Maple Leafs are going to end up at the end of the season.

Mr Callahan: That is easy.

Dr Harvey: In their case, it is very easy. But it is analogous to the problem of trying to predict the relative standings of the teams at the end of the season versus what the scores are going to be and who is going to score the goals on each and every game.

You could also predict who the top five scorers are going to be quite well, but you would be very poor at predicting who is going to score in any one given game. So although we cannot predict the weather beyond a few days and there are good reasons for that, that does not imply that the climate predictions are all garbage.

What we do with the climate models is we run them for present-day conditions and try to simulate the present-day climate as best we can. Then to verify the model, since what we are predicting is climate and statistics, we need to then try to predict a completely different climate for which we have good data and for which we have a pretty good idea of what was causing it.

Well, one good candidate is the last ice age, and this sort of calibration verification suggests that the response to a different forcing, the CO₂ doubling, should be in the range of 2 to 3 degrees.

This transparency is one year old. A year ago the models were projecting 3.5 to 4.5 degrees for CO₂ doubling, but all along, those of us in the scientific community have thought that the models were tending to overestimate the response. The George C. Marshall people are trying to take credit for what we told them and what we knew all along. I mean, all along it was expected that this was an overestimate and that once we had made some further changes in the cloud computations, these numbers would come down, and that indeed has happened in the last year. So now the models are falling more into the 2 to 3 degrees temperature range, which is in agreement with this ice age comparison, but still greater than what you would expect based on the warming over the last 100 years.

Now this inconsistency could be explained if the lag effect of the oceans is much greater than we have estimated, or it could be explained if there has been some natural factor which has partly counteracted the effect of the greenhouse gases increasing over the last 100 years. It is not clear what the explanation is at the moment. So this is the range of numbers for the CO₂ doubling. Equally or perhaps more important is the rate of climatic change. For the global mean, the rates which correspond to this sensitivity and our best estimate of how much the oceans would slow and delay things correspond to about 0.3 to 0.7 degrees per decade rate of warming reached by the middle of the next century for business-as-usual scenarios. You could double that for higher-latitude locations like Canada. So we are talking on the order of one degree or more warming per decade, and that is a phenomenal rate of increase.

With regard to the impacts, this is actually the fourth step now in the sequence. The press, and the television documentaries in particular, like to show pictures of the advancing Sahara Desert whenever they start talking about the greenhouse effect, as if scientists thought that the effect of this warming would be to turn the world's agricultural areas into deserts. Even the worst-model projections do not have the centre of North America turning into a desert, and it is generally felt, for good reasons, that the models that predict the worst drying are overpredicting the drying.

When you add on top of that the direct stimulatory effect of carbon dioxide on crops, the tendency of higher carbon dioxide levels to increase the water use efficiency of plants and the possibility for adaptation, changing cropping patterns, changing agricultural practices to conserve soil moisture and so on, the consensus of agricultural experts is that modern agriculture, at least in the developed world, can handle the likely impacts of carbon dioxide doubling.

Of course, keep in mind that that is not where the story is going to end. We may very well be able to handle CO₂ doubling, but what worries me is if it is allowed to go to three or four times and if we are going to stabilize CO₂ at, say, the doubling level or the equivalent, taking into account other gases, if we are going to do this with minimum economic disruption, then we really have to start now so that we can make an orderly transition to stabilize it at this two times doubling level. So I am not too concerned about agricultural impacts; and likewise, with assistance from the developed world, the Third World, in principle, could handle the likely effects.

What bothers me most are the impacts on forests. Forests are very important biologically, for recreation and economically. It is this one degree warming per decade which could significantly impoverish midlatitude forests and create real havoc. As well, the sea-level rise, even if it is only half a metre instead of one metre by the end of the next century—again, it is not going to stop there. It will not rise and then just stop if we do not do anything. But even the half a metre rise will have significant impacts.

Much of the world's population lives in densely populated lowland deltas, and if we think we have a refugee problem now in this country, we ain't seen nothing yet. If we inundate part of Bangladesh, it is not impacting just Bangladesh, but then there is a wave of people moving into India. It is going to impact India, and then as many of them as possible are going to try to come here.

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As well as sea-level rise in itself, the rate of sea-level rise, just like the rate of warming, is very important. The sea level has fluctuated naturally. It rose at the end of the last ice age and there has been a slower rise in the last few thousand years, but there are natural processes to compensate. Sedimentation can keep up with the rise in sea level if it is slow enough. It is this gradual sea-level rise, coupled with sedimentation, which has built these huge lowland areas,

mangrove swamps, which ring much of the continents of the world.

Apart from providing important biological and ecological functions, they also have important economic functions. They serve as storm-surge barriers and they have recreational value. If the sea-level rise is too fast, it will outpace the ability of these surfaces to aggrade through sedimentation and we could lose a significant fraction of the world's wetland and mangrove areas. That will impact fisheries, migratory birds and ecosystems in the areas where those birds spend their summers, like in Canada for example.

Mrs Grier: Do those wetlands not contribute large amounts of methane?

Dr Harvey: Yes, the wetlands are a natural source of methane.

Mrs Grier: Is there any balance there if we lose wetlands?

Dr Harvey: Yes. It might very well be that humans have had no net effect on methane fluxes, because we have decimated the many herds of ungulates like bison and deer which, like cattle, are also sources of methane. We have drained a lot of swamps, and thus eliminated those methane sources. So it is really not clear what the net effect of human activities over the last several hundred years is on methane.

At any rate, as I said earlier, we can stabilize the concentration of methane through a 10 per cent cut in emissions as long as the lifetime stays constant. That is a very big proviso, because we could be affecting the concentration of methane more by increasing the lifetime of what is there, naturally or otherwise, more so than by direct emissions.

The way we might be increasing the lifetime of methane is through emissions of carbon monoxide. Carbon monoxide eats up the hydroxyl, the OH molecule in the atmosphere, and the OH is the atmosphere's chemical cleansing agent. In particular, it is responsible for much of the removal of methane. So we might have to focus as much on carbon monoxide emissions from automobiles as on direct methane emissions from landfills in tackling this problem.

I will try to finish in another five or 10 minutes.

This transparency is the result of some of my own modelling calculations using a carbon cycle model coupled to a climate model, where what I have done is bypassed the economics, because I think that is the biggest uncertainty, and just specified various arbitrary rates of change in fossil fuel emissions growing by either one per cent per year, two per cent, one per cent constant,

or falling by one or two per cent per year. So I have specified the emissions.

That is run through the carbon cycle model to calculate concentrations. That then is run through a climate model to calculate the climatic warming. That then feeds back on the carbon cycle model, affecting both the rate of photosynthesis and the rate of respiration, and also the rate at which the ocean can absorb carbon dioxide. What I am showing you here is the net result of this interaction. This is the globally averaged temperature change for these scenarios.

This is assuming a high-sensitivity case, that the climatic response to CO₂ doubling is 4 degrees, which I think is probably too high, but for the sake of argument, to avoid being too optimistic, I have used in this case the high sensitivity.

You can see the impact of different scenarios. Even stabilizing emissions substantially reduces the warming by the middle to the end of the next century compared to these growth scenarios. In all these cases indicated by the solid lines I have assumed that methane, nitrous oxide and low-level ozone continue to increase. So after a while, you get a lot of diminishing returns, if you focus just on the carbon dioxide, because the other greenhouse gases are increasing.

This dotted line shows the case where you stabilize the other greenhouse gases besides CO₂ and you have this two per cent per year decrease. This allows the climatic warming to peak at under 2 degrees for the high-sensitivity case. For the lower-sensitivity case, it would be less. People say that there is so much uncertainty, we should not do anything about it.

I have been working with some consulting engineers recently and the engineering perspective is quite interesting. It is completely contrary to standard engineering practice to ignore a problem if there are uncertainties. Quite the contrary: if you are designing a building that has to withstand earthquakes and there could be earthquakes with magnitudes of 6 to 8, you certainly do not ignore that uncertainty and build only for magnitude 6. Rather, you build for at least 8 or 8.5. On the other hand, you might not build for magnitude 10.

So the standard engineering practice is to build against the worst plausible earthquake or stress load or whatever, and I think for the purposes of planning, we should take the higher-sensitivity limit, just as we would build against the most serious anticipated earthquake.

In that case, we can see that if we want to limit the global warming to 2 degrees, then we have to

stabilize all the non-CO₂ trace gases and we have to get a two per cent per year decrease starting some time in the early part of the next century. Of course, before we can get a decrease, we have to stabilize. This gives us some idea of the time frame and the sort of magnitude of reductions required to limit the warming to a certain threshold for the cautious, worst-case assumptions. This is a scenario of continuously increasing concentration and continuously increasing response. This takes into account the oceanic lags, according to our best estimate.

Let me go back to the equilibrium case which is ignoring the time factor and just concentrating on this one point, the two times doubling. This is just to give you some idea of the computer model predictions for the equilibrium change in temperature for two times doubling. This is for three of the five or six models that have now been used for this study. This is for the summer case.

If you look at any one region, let's take Canada for example, there are dramatic differences among the models, in excess of 8 degrees in Manitoba for the Geophysical Fluid Dynamics Laboratory model and around 2 degrees for the National Centre for Atmospheric Research model. So there is a factor of four uncertainty for this one particular point in the continuum. You will find similar uncertainty for other regions.

So what we see is that the models completely disagree when it comes to the regional details. On the other hand, the global average warming for these models predicted varies only from 3.5 to 4.2. In this business, that is pretty good. The models that agree on the global average response, which is what we have been looking at here, completely disagree when it comes to the regional details.

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If we look at the winter response, we see similar disagreement. It is 2 degrees over Canada here, and 10 to 12 for this model for the same region. So we are dealing with a considerable uncertainty; we are also dealing with risk. If you look at soil moisture changes in specific regions, you find similar disagreement, although the general patterns are in agreement. It is just when you come to details in specific places that they disagree. So if pick any place in the world, you can likely find a model that predicts favourable conditions for two times doubling and you can find another model that predicts unfavourable conditions, and we do not know which models are right. Therefore, everybody is at risk. It is a question of risk, not certainty.

Furthermore, the patterns are likely to change completely as we go from two to three times CO₂, and for one and a half times CO₂ the patterns are likely to be quite different from what we see here. So everybody is at risk. There are likely to be some winners and some losers, but we do not know who the winners and losers are. Furthermore, winners at one time are likely to become losers at a later time, because what we are talking about is continuous open-ended change if we do not take remedial measures.

Let me just look at the question now of what can be done. This is pretty standard stuff. Everybody will give just about the same list. There is prevention and there is adaptation. There is already a certain amount of warming in the pipes, particularly if we want to make transitions gradually to avoid economic disruption; then we are anticipating 1 to 2 degrees warming, unavoidable.

So there is going to have to be some adaptation, but we can also do much in the way of prevention. The three categories of action are to increase energy efficiency, to reduce the total demand for energy, and of that total demand, supply as little of it as possible with fossil fuels; of that portion which is supplied by fossil fuels, supply as much of it as possible with low-carbon-dioxide-emitting fuels like natural gas.

This transparency compares the CO₂ emission per unit of energy for different fuels. You can see natural gas at the bottom and synthetic fuels, the Alberta tar sands for example in synthetic crude, being the worst culprit. On top of that, in many instances, natural gas can be used more efficiently. So in addition to there being less emission per unit energy, that energy can be used more efficiently, so you get a multiplicative effect.

Natural gas is definitely the fossil fuel of choice, and I am quite concerned—I do not have really any information on this—that the National Energy Board has approved sales of natural gas amounting to 90 per cent of current reserves. Of course, the size of the reserves changes and increases as price increases. But I do not know and I am asking this question—perhaps someone knows—if the National Energy Board has taken into account the fact that if we move to limit carbon dioxide emissions, there is going to be a dramatic increase in the demand for natural gas.

Are we confident we can sell 90 per cent of our gas to the United States and anticipate increased demand if we have to switch from coal to natural gas? Also, the price of natural gas is sure to go up if there is a move to reduce carbon dioxide

emissions. I do not know the answers to those questions.

I suppose all of you have heard about the federal-provincial-territorial task force that commissioned a consulting group to look at the potential for emission reductions through the efficiency improvement strategy and through fuel switching. This consultants group, the DPA Group, has received a lot of criticism but I suspect it probably only had a \$50,000 to \$100,000 budget and two to four months to do it. You cannot expect a very detailed or thorough study of the problem for that amount of money; there is a similar study going on in the United States right now with a \$3.7 million budget and two years to do it.

Nevertheless, as a first approximation this is probably a useful study, and it indicates that we can come pretty close to meeting a 20 per cent emission reduction target by the year 2005 through improved energy efficiency and through fuel switching. The task force and the DPA study concluded that the first three quarters of that reduction would result in a substantial net saving to the Canadian economy in the order of \$100 billion. That of course is a very uncertain figure, and we really need not quibble over just how much it is. The point is there is some initial set of measures that will actually save us money, and this type of result is not unique to Canada. Studies in country after country have come to exactly the same conclusion.

I will just summarize with some characteristics of the greenhouse problem. This slide I actually stole from a talk I gave to an interdenominational religious group on the ethical dimensions of the issue, but we all have a responsibility to consider the ethical dimensions.

The characteristics, in summary, are first, that there are likely to be some winners and some losers, at least initially. We do not know in advance who the winners and losers are. Winners at one time might be losers at a later time if we have open-ended change. Everyone therefore is exposed to risk. There are long lag times. There is tremendous inertia in all the components of the system, the economic components, the carbon cycle, the climatic response. Therefore, because of these long lag times, if we wait until we know the answer for sure, it will be too late to do anything about it except adapt, and there are real problems of intergenerational equity and interregional compensation.

Mr D. R. Cooke: Could we get a copy of Professor Harvey's slides?

Dr Harvey: Oh, yes, sure.

Mrs Grier: Could you make a little clearer to me "stabilization" as opposed to "reduction."

Dr Harvey: There are two issues. Are you talking about stabilization of emissions or stabilization of concentration? The ultimate goal should be to stabilize the concentration of greenhouse gases in the atmosphere, but as a first step—

Mrs Grier: Explain both of those as you go. The ultimate step should be the stabilization of concentration. What does that mean?

Dr Harvey: If we stabilize emissions—the projections are for the emissions themselves—

Mrs Grier: To go up.

Dr Harvey: —to continue going up, so each year we are putting more and more carbon into the atmosphere than the year before. The first step will be to stabilize those emissions, but even with stabilized emissions—that is the zero per cent rate of change here—the concentration will still continue to increase, albeit more slowly than if the emissions themselves were increasing.

Mrs Grier: Why?

Dr Harvey: Because at the current rate of emissions, if we stabilize at the current rate—

Mrs Grier: Okay. We are out of balance already.

Dr Harvey: Five billion tonnes a year: That is faster than the ability of the oceans to absorb it and it is greater than the enhancement in photosynthesis, which might or might not occur.

Mrs Grier: The recommendation that we reduce at the 20 per cent level: Is that based on a model that says, "If you reduce 20 per cent, this will happen," or is it based on, "This is possible to do"?

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Dr Harvey: No. The 20 per cent is not a solution to the problem. It was regarded as an interim step. The report that recommends the 20 per cent says that to stabilize atmospheric CO₂ will require reductions in the order of 50 to 80 per cent, so the long-term goal will be at least a 50 per cent reduction. We need some flag posts along the way, so a 20 per cent reduction by 2005 was selected because it was an aggressive, ambitious target, but one that was felt to be fully achievable.

Mrs Grier: Do we have any idea of what effect that would in fact have?

Dr Harvey: I did some modelling. I do not have the results with me. It reduces the

magnitude of the problem. Even stabilization—you can get some idea from this transparency. If we decrease by 20 per cent by the year 2005, that means we are decreasing by two per cent a year from about 1995 on. This curve just assumes we keep on decreasing by two per cent a year, so that would give us a 50 per cent reduction in about 2020. This would give us a 50 per cent reduction in emissions by 2050 or so.

If you regard that 20 per cent as part of the continuous emission reduction beyond the year 2005, this gives you an idea of what difference it makes. It improves it, certainly compared to the stabilization case, but you can see there is definitely a law of diminishing returns if you are not also going after these other gases.

Mrs Grier: The 20 per cent was sort of a global reduction, was it not?

Dr Harvey: It is really ambiguous just what was intended. A recent report came out that was funded by the Dutch Ministry of Housing, Planning and the Environment, which said, "Okay, let's take that 20 per cent and apply it to the industrialized world only." I think it is unrealistic to apply it to the world as a whole.

I think we are going to have to allow politically, if not economically and technically, some interim increase in emissions in the Third World. There is no way we are going to avoid that. But if that increase could be limited to a 50 per cent increase from the developing world, coupled with a 20 per cent decrease by 2005 in the industrialized world—it is 20 per cent but acting on a larger base—that combination results in the same emissions in 2005 as in 1988. That gives us the goal of global stabilization in 2005 while applying the 20 per cent cut only to the industrialized world. Then we could proceed beyond that, beyond the 20 per cent reduction in the industrialized world, and then stabilize them in decreasing emissions in the developing world.

It works out that if you then continue these downward trends, we are allowing a total cumulative emission over the next 100 years of 300 billion tonnes of carbon, of which 150 billion would be from the industrialized world and 150 billion from the developing world. We are saying, okay, there is a certain allotment for the next 100 years which allows us to stabilize temperature at less than 2 degrees warming, and rather than getting into technical arguments, we just split that allotment 50-50 between the developed and developing worlds. In a way it hopefully simplifies the political problems, although they are still very complex.

Mr McGuigan: The 20 per cent, I am assuming, assumes that we keep our present lifestyle, that simply by more efficient use of fossil fuels we continue living more or less as we are. Is that part of that scenario? It does not take in a great revolution in, say, just abandoning the automobile or outlawing the automobile. It assumes that present lifestyle.

Dr Harvey: Yes. A number of studies have shown on paper that you can get the cuts with no changes in lifestyle, but that is not really looking at the technical potential, assuming that everybody does indeed replace 70-watt incandescent bulbs with 17-watt compact fluorescents and so on and so forth. In practice we may not get 100 per cent penetration of all these energy efficient technologies. Also, there are all sorts of behavioural problems. If, because people now have lightbulbs that use one quarter the energy, they leave them on all time, more than they did before, that is sort of wiping out some of the benefit that you can get on paper.

I think there is an important educational role in this, that just because you are now using one quarter of the electricity it does not give you a licence to never turn your lightbulbs off, or you are going to wipe out all that gain. There is an important educational role and the behavioural response is important.

Some modest lifestyle changes will certainly make things a lot easier. In particular, if we could make it really convenient and really practical to commute by public transit in the major cities of Canada, so that people can leave their cars at home for much of their commuting, that would help. I think, given that some of the theoretical gains from energy efficiency are going to be wiped out by behavioural modifications, like leaving the lights on more, we should do everything we can, and if we can bring about some modest changes in lifestyle, everything helps.

Going beyond the 20 per cent, I think we are going to have to really come to grips with some of the premises by which every single politician gets elected and some of the deep-seated assumptions and value systems of just about every economist, and that is this whole notion of economic growth. Part of it could be a bookkeeping gimmick. I am not sure in my own mind if, ultimately, we need zero economic growth, but one thing is for sure, that we need zero growth in the consumption of resources. We cannot have continued growth in material consumption of resources.

We have to ultimately tackle this question of economic growth. One of the things that makes it so hard for the task force to get this 20 per cent reduction in 2005 is that they are assuming growth in the labour force, which is one thing, and then on top of that, growth in per capita consumption of goods and services. We are going to have to tackle that question.

There are some economists—I think Herman Day is one of them—who have been looking into what they call equilibrium economics, an economics where the system is not dependent on continuous growth but is a balanced equilibrium system. I think ultimately we are going to have to face that question.

Mr McGuigan: The dilemma there is that the capitalistic system absolutely depends on growth.

Dr Harvey: It seems that resolving our national debt is dependent on growth. It looks like now the only way we are going to get rid of it is to grow out of it.

Mrs Grier: That is what alarms capitalists.

Mr McGuigan: I just want to finish what I was saying. The capitalist system absolutely depends upon growth. At least that is the theory.

Dr Harvey: As it is formulated now.

Mr McGuigan: Yet other peoples in the world who have tried a different model are now moving towards the capitalist system, so all of these things that you are talking about are going to be accelerated.

Dr Harvey: I do not think we have to throw out the capitalist system. We are going to have to modify it. It is clear that what we are doing is not sustainable in the long run. Maybe we can have continuous economic growth, but it might be in a way just a bookkeeping gimmick. If we attribute more and more value to the services we are providing, but those services are information-based services, then it might be possible to have infinite economic growth and yet have something that is stable and not growing in terms of the physical consumption of goods. But I am not an economist and I cannot really get into this. I think ultimately we are going to have to ask some of these questions about growth for growth's sake.

The Vice-Chair: Thank you, Dr Harvey. It has been most interesting. I can see that our discussions over the next week and onwards from that will find what you have had to say very useful. Thank you for coming. We will adjourn until two o'clock.

The committee recessed at 1231.

would look after that issue, but of course it will not. We now know that methane, nitrous oxide and the other contributors are also very important and are increasing rapidly; methane the most rapidly of all. I am afraid we left the job unfinished.

However, as a target for Ontario, my feeling is that it is feasible. It would be feasible for us to get down to the 20 per cent figure, and if we did, it would be a remarkable example to set for the rest of the world, because I think other countries will have a lot more difficulty reaching it than we should. We have so many options and they do not.

As regards stabilizing it, I think that is really not perhaps good enough. At the present concentration of 350 parts per million of carbon dioxide and an equivalent amount of the other gases in the atmosphere, the temperature will continue to rise. Stabilizing it at the present situation will not stop the temperature rise, because there is a delay associated with the oceans. It will be decades before the temperature rise would cease, if we simply stabilized matters as they are now. We have to go for a reduction.

Mrs Grier: Do you have a figure? What is your estimate of the temperature rise? We heard today, from Dr Harvey, two degrees centigrade as a postulate.

Dr Hare: By the year 2030?

Mrs Grier: Yes.

Dr Hare: I am influenced in this by the fact that I have just gone through all the models again and tabulated the results, and the average of all the models that I looked at is 1.9 degrees Celsius by the year 2030. The ones that strike me as being lunatic fringe models are somewhere near 3.5 or 3.6 and the ones that strike me as being too small—conservative to be true—come in at around about 0.9 degrees by the year 2030. The uncertainty is not because the modellers are wrong or stupid or anything like that; it is because they make different assumptions. They also are influenced by the particular scenario of energy use that they have been fed; that influences the way in which they do their calculations. I think that 1.6 is probably a pretty good estimate; 1.9 is probably a little bit too high.

Mrs Grier: How do we arrive at what Ontario would have to do to make no contribution to that kind of a temperature rise?

Dr Hare: In Ontario, I think that reaching the Toronto conference level, the 20 per cent reduction—

Mrs Grier: By 2005?

Dr Hare: —by 2005, would do the trick. There is no way of solving this one, because the atmosphere over Ontario is dominated by other people's carbon dioxide and other greenhouse gases. It is what others do. Nevertheless, to set an example, I am still very attracted by that 20 per cent by the year 2005.

Mrs Grier: But yet the Ministry of Energy tells us that no national government has adopted it and that it is not feasible.

Dr Hare: Are you listening to Bunli Yang? He is on your list of witnesses here.

Mrs Grier: No, I have not met him yet. Is that his theory?

Dr Hare: He is very good, and if he says it, it is probably true. I think it has going to be a real problem to get this target accepted by any government because it does represent a real problem to most jurisdictions, as I said, many more than it does to us. We do have alternatives, but most governments do not.

I can understand why they hedge. It is not merely that they are trying to satisfy the fossil fuel lobbies in their own countries. The capital costs of switching the modes of energy production are very high. They do not know what to do about the private car. What on earth do you do about the private car? It is the largest part of the whole business, to me. People concentrate on electric power as if that is the only issue. Well, it is an important issue, but I repeat it is ultimately going to be the transportation question, it seems to me, that will be the problem.

What I am trying to say is that in the province of Ontario, in my own view, what we should do in the way of policy is to go as far as we can in reasonably cost-effective ways, using the word "cost-effective" as Mr Charlton was using it—in other words, a rather more long-term cost-effectiveness than we have been accustomed to take—and push hard to get others to go in the same direction and hope that we reach the 20 per cent by 2005. Our own utility has done the work of what is involved in doing this inside Ontario. Since this is a document that you have before you, I will not pre-empt it. Incidentally, you should talk to Carol Burnham, the young woman who runs this enterprise.

Mrs Grier: I suspect we are going to, because Ontario Hydro is coming in next week and she appeared before one of our other committees.

Dr Hare: I hope Carol Burnham will be with you. She is the person to answer these questions rather than me.

Mr Charlton: There are two other aspects of what you have had to say today that I would like to follow up on. You and Dr Harvey have both talked about equilibrium in the natural system. Dr Harvey talked this morning about what I think you were saying this afternoon, although you did not use the specific words. I just want to confirm that we are all talking about the same thing. He talked this morning about the residuals after the natural processes. The residual, I think, is what you were referring to as a natural greenhouse effect which keeps the earth's temperature higher than it otherwise would be. In other words, if the system were in absolute balance and there were never any concentrations of the greenhouse gases in the atmosphere, there would be no residuals. So the residual is what you were referring to as the natural greenhouse effect that has a benefit for the earth.

Dr Hare: I do not know what Danny was saying. Danny was my student and taught me a lot of what I know, because any good student teaches his professor. It comes out of his ears. But that is not the way the word "residual" is normally employed by economists. The residuals, in the economists' sense, are those things that at the end of the day you cannot use and you therefore throw away. I have served on the board of Resources for the Future for 12 years. It was they who introduced the notion that residuals management was really the key to internalizing the true costs of industrial production.

Perhaps if I put the numbers in it, you can judge for yourself whether I am saying the same thing as Danny. May I use the absolute temperature scale for a moment? It is easier for me. The numbers are in centigrade units, but they will not sound the same because the Kelvin scale starts from absolute zero.

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The world would have a temperature of 255 if the atmosphere were made of oxygen and nitrogen. Now, 99 per cent of the atmosphere is oxygen and nitrogen, so you might expect that that figure, 255, would be pretty close to it, but in fact the less than one per cent of the gases in the atmosphere, of which carbon dioxide is the most abundant, that have this heat-trapping property raise the temperature naturally to about 288 degrees Kelvin, which is from 255 to 288. That is absolutely natural. It is produced by the natural presence in the atmosphere of these gases, carbon dioxide, nitrous oxide, which interchange constantly in nature with the soil, the plants and the ocean. What I meant by equilibrium was to say that.

What we are doing is to add a little bit. Nature, for example, interchanges—the figure in my mind is 63 billion tonnes—between the green plants, the soil and the atmosphere, in both directions, and they are in perfect balance in nature, in equilibrium.

But if you cut down the forests, you alter, of course, the amount that is taken in from the atmosphere. It is very difficult to say how much, because young, growing trees absorb more rapidly than old trees. On the other hand, they have got less carbon in them. Doing that sum is quite difficult.

What we are doing is adding just a few billion, actually five billion, to a very large process. Accordingly, all of these things come out when you do the sums as residuals. They are the difference between two very large numbers. I think that is what Danny must have been saying this morning.

Any scientist knows that when you have to take the difference between two very large numbers, you have to be awfully good at making those numbers. In dealing with big numbers that are very much alike and what you are concerned with is the difference between them, the residual, you have to be very precise in measuring both of them. That is the problem in this game. It is very difficult to be precise.

I do not know whether that helps you in understanding what Danny said or not, but I am sure that is what he meant.

Mr Charlton: Yes. As I understand it, you are both saying the same thing, so yes, it does help.

The question that flows out of that for me is, can science at this point give us—I am not talking about precise numbers now, certainly, because I know, as you said, there is a lot of research still to be done because the amount that has been done has been small to date—some kind of an idea, in light of the questions that Mr Callahan was asking earlier, how much the five or six billion tonnes that man is adding by our human economy to the concentrations in the atmosphere, over and against the concentrations that should be there when we are in equilibrium? In other words, what is the size of the problem, not over and against the total production of CO₂, for example, but about the amount of CO₂ that should be left after the natural processes in the atmosphere, how much are we adding to that problem?

Dr Hare: Let me give the numbers. Let's take, first of all, the amount of carbon in the atmosphere. It is currently 750 billion tonnes of elemental carbon. That is a measured quantity. We measure this all over the world in numerous

stations, and the precision attached to it is really quite high.

It is increasing at the rate of just under three billion tonnes per annum. So next year it will be 753 billion. The year after that it will be 756 billion or thereabouts. This has been going on throughout my life, although the rate is accelerating. It currently is that the observed concentration is increasing at three billion.

I cannot tell you precisely what the concentrations of the other greenhouse gases are, but they are equivalent to about three billion tonnes, so the actual rate of increase of the sort of potential greenhouse effect is in the order of six billion tonnes.

Mr Charlton: Yes, so the 750 billion tonnes that you called elemental carbon is the basic concentration that is out there unused.

Dr Hare: That is right. It was originally, before we messed it up, before we started releasing it, somewhere down in the 600s. We have got it up to 750 billion in the course of the industrial revolution. The other gases, we just do not have any measurements on them before about 1978, so I cannot tell you much about the other gases except that they currently double the effect of the carbon dioxide.

Now then, the human economy, I can give you figures on that. This is to some extent a projection, because the figures are not all in. In 1989, I expect the total release of carbon out of chimneys and exhaust pipes to be 5.6 billion tonnes per annum. The clearing of forests and the wastage of soil carbon probably add another two billion, so that the net increase, the net release as the result of human interference, is the 5.6 billion that we burn, plus the two billion that we are releasing by messing up forests and soils, a total of 7.6 billion.

The 5.6 billion figure comes out of the United Nations economic year-book, economic statistics. They are data gathered by civil servants like the ones who sit around you in the buildings around Queen's Park. That is pretty good information when it comes from the United Kingdom or the United States or from Canada; it is lousy information when it comes from Zaire or Algeria. Third World countries do not have the economic infrastructure to make that figure stick really.

Oddly enough, the UN is very sophisticated about this. It thinks it knows how to do it. I have come to the conclusion that they are probably right and that that figure of 5.6 billion is probably itself right.

The two billion tonnes coming from the destruction of forests and the wastage of soil carbon is, frankly, a highly disputed figure. In the past 20 years, I have taken part in two major international exercises to try to come to this figure. I have just finished a term as chairman of the advisory group on the greenhouse gases of, let's say, the UN system. There were five agencies; five UN agencies subscribed to it. We undertook one of these reviews. The Intergovernmental Panel on Climatic Change, which is the one that led Mr Bush and Mrs Thatcher to go off to The Hague recently, has also tried to get an estimate of this figure.

All I can say is that two billion is the best guess that we have all been able to come to. There are so many unknowns. How on earth do you measure what is actually happening in the Amazon rain forest? We can see it from the air. Our satellites are now so precise that we can see the destruction, but of course they are still not precise enough to tell you exactly how much carbon is coming off.

I may say that one of the objectives in my life—I do not know how long I am going to live; I am 71—is to turn the screws on the military and say, "Turn loose the military technology." Military spy technology is vastly more sophisticated than the stuff that is available to mere scientists like me, and why on earth, in this present day and age, we do not use it in support of these objectives I do not know.

Gradually, we are winning this one. Slowly, the payload in these satellites is getting more and more like what the military has been achieving for years. I am not supposed to know what they achieve, but I do know a bit about what they achieve, and what they achieve is a lot. If we could only get our hands on the stuff that goes up—for example, what went up the day before yesterday, or was supposed to go up the day before yesterday—from Cape Canaveral, I think we could give you a much more precise answer to the two billion that is the figure I gave you.

1520

Mr Callahan: I hope I am understanding this correctly. You are saying that within the atmosphere there is carbon dioxide, there is nitrous oxide and there is oxygen. By us increasing the carbon dioxide—I look at it as a big envelope—we must be forcing those other gases out, squeezing them out or whatever. Are we doing that?

Dr Hare: No, because we are burning oxygen to do it and taking the oxygen out and the volume has not changed.

Mr Callahan: What about the nitrous oxide?

Dr Hare: The same thing. The nitrous oxide that is being released is in fact originally atmospheric nitrogen.

Mr Callahan: So it is just a change of gases.

Dr Hare: Yes.

Mr Callahan: I had this picture of us all choking to death at some point because there would be no oxygen, which might happen, I suppose. If it cannot be synthesized back into oxygen because of trees being killed by acid rain, we may choke to death.

Dr Hare: Ultimately, if the green things were destroyed, yes, we would go out of the window. The green things are necessary. The oxygen in the atmosphere, and indeed in the oceans and that circulates through soil is all oxygen that was ultimately released by photosynthesis, but that photosynthesis started two billion years ago. It has been accumulating in the atmosphere throughout that time, so the oxygen supply in the atmosphere now is literally colossal. The present living things, the present green plant cover, does indeed release oxygen, of course, as it photosynthesizes, as I am sure you are aware—you used the term yourself—but the amount of oxygen used is a trivial part of the oxygen in the atmosphere in any given year and the amount released is a trivial part.

That is not true of the carbon, because the atmospheric carbon supply is very much smaller. That is why we lay so much emphasis on carbon dioxide, and the other one is that of course carbon dioxide is just as necessary to life as oxygen is. Oxygen keeps you going and keeps me going, but your flesh and my flesh, all of our flesh, is made out of plant tissues that we eat, ultimately—either that, or the animals that ate the plant that we then eat—which comes out of the atmospheric store of carbon dioxide. That is the origin of life.

Carbon dioxide, water and oxygen are all three absolutely fundamental to the continuance of life. Oxygen is present in huge quantities, water is present in huge quantities, but carbon is not. There is lots of carbon, but it is mostly in the atmosphere.

Mr Callahan: What does the carbon monoxide do to this whole?

Dr Hare: Carbon monoxide does not do a great deal, because it very quickly turns into carbon dioxide or is absorbed by the soil. It is very quickly oxidized. The atmosphere cleanses itself of carbon monoxide.

I could not believe my ears when I heard this story about carbon monoxide being released in

our hockey rinks reducing the efficiency of hockey players by literally suffocating them when they were on the ice. What is the machine called, a Zamboni?

Mr Callahan: Zamboni, yes.

Dr Hare: That is an extraordinary story.

Mr Callahan: I think the patent just ran out on the Zamboni. That is why they came out with that.

Dr Hare: I am not going to put my money into an alternative to the Zamboni machine. There are others that do not use diesel fuel, I gather.

I think the answer is that carbon monoxide is a human toxin which we want to avoid. It is a nasty substance for red-blooded animals of all kinds, but really, there is not an awful lot of it and it very quickly cleanses out. So it is not a problem. It is problem locally, but not on a world scale.

Mrs Grier: How do we answer those who feel that for Ontario there are enormous advantages to this? We will be growing kiwi fruit in southern Ontario and the camping season—I saw some professor of geography at Waterloo saying the revenues would be increased because we could use the provincial parks longer. There are Pollyannas out there. How do you respond to them?

Dr Hare: I think the answer is that of course you can draw up a profit-and-loss approach to this. Obviously there are certain things that are going to profit from this.

I remember Bob Shaw, the Foundation Co of Canada Bob Shaw. When he was the Deputy Minister of the Environment, he said to me, after I had given him the greenhouse story, which was back in 1972, "How can you sit there and tell me as a Canadian that I ought to be opposed to a warming of the climate?" Of course, he is right in that respect. It would be a lot more comfortable for us. I think kiwi fruit probably would be marginal but not impossible. There are short-season kiwi fruit that we might conceivably produce. But it is not a very serious question from the point of view of Ontario farmers.

The number of hybrid corns that will do the job they are supposed to do in our growing season would be very greatly increased by this warming, so that they would certainly profit from the versatility of their sort of cross-grain production capacity. On the other hand, there is every prospect that there would be perhaps some slight fall of precipitation, and a considerable increase in evaporation, which means that they would need more irrigation water.

The art of doing climatic impact assessment is always the question of balancing gains against losses, because there are always gains in these things for somebody. Certainly I think that we are, in a sense, in a fortunate position in this country. The only reason I am a little bit concerned about it is the Palliser triangle out on the Prairies. If it were just Canada, the balance sheet might well come out positive, which is another reason why I think you have to be statesmen rather than politicians in this game if you want to get anywhere. In the long run, after all, we are a trading nation. We depend on the health of the countries overseas.

Mrs Grier: So we keep being told.

Dr Hare: Well, we do. Look at the balance sheet.

The Vice-Chair: Thank you, Dr Hare. I think that, as usual, you have raised some interesting questions for us to explore next week. I would remind the committee members that we will be meeting Monday morning at 10 o'clock sharp. Our chairman will return being suitably globally warmed.

Mr Callahan: Could I ask one final question? Just so I understand it, when people see the winters being less ferocious than they have been in the past, you hear people saying that is the greenhouse effect. If I understand it correctly, although we may be able to grow kiwi fruit or something like that in Ontario at some stage down the line, or so they say, the rest of the world that is presently hot will get hotter. Is that right?

Dr Hare: Yes.

Mr Callahan: So in a place like the Sudan you would be able to fry an egg on the back of whatever is still alive there.

Mr Charlton: You can already do that.

Dr Hare: I was going to say you certainly can do it.

Mr Callahan: So what looks good to the Pollyannas of Ontario could prove to be death to the people of certain other areas?

Dr Hare: Absolutely. That is why you cannot afford to take a parochial view of this and why we have to approach it as a world problem. It is not just a question of our trade and so on; it is a question of whether we can tolerate seeing the rest of the world put to such a burden. In spite of all appearances to the contrary, I think the foreign policy of every country has a certain amount of moral content to it and I feel we have some kind of obligation to do something about it.

Mr Callahan: Finally, I presume this is in some way linked to the question of acid rain.

Dr Hare: Very much so.

Mr Callahan: If your lakes are acidified and your trees are killed by acid rain, you then accelerate the whole process within, say, Ontario?

1530

Dr Hare: Yes. Might I generalize that? All these things are linked: the ozone problem, the carbon dioxide problem, the acid rain problem. They are all illustrations of the fact that we are upsetting the chemistry of the atmosphere. You cannot separate them. In fact, what we need is a rational policy for atmospheric quality. We need a sort of law of the atmosphere to protect the whole thing, because they are all connected.

The Vice-Chair: I see we have provoked some more interest. Mr McGuigan will ask the final question.

Mr McGuigan: I want to enter that discussion about setting aside the ethics of it. I realize the ethics are very much a concern of all of us, but just on the strict economic aspects, if we think we have a lot of soil erosion and degradation problems today, and you link that also to the loss of carbon—and I happen to be one who believes that and I champion that conservation ethic—wait until we have a open winter situation where soils are not frozen. Being a northern climate, our soil is frozen during at least several months of the year. Nature protects those soils, but if we go into, say, a climate like Georgia's, which a lot of the predictors say we would have, we would then have a situation where the soils would be subject to erosion year round.

The other thing about it is that it is pretty questionable how much we would beat the present climate that we have. Our yields of corn here in Ontario are very close to those in the American corn belt, the difference being that while they have a longer season than we do, they actually reach temperatures, above 80 degrees, at which the corn growth slows down. Here in Ontario we have a shorter season, but a more sudden season. We do not have much of a spring; we go from winter to summer and we do not get very many days above 80 degrees. We get some in southwestern Ontario, but presently we have about as good a corn-growing climate as you can get.

The possible advance would be in the clay belt in northern Ontario where there are three million acres ready for the plow, except that we do not have the climate. But even there, growing

alfalfa—which we have no way of curing in our present climate—if we had an artificial way of curing that alfalfa, you could grow as much total digestible nutrients on those three million acres as you can in southern Ontario growing corn. It is pretty questionable how much real advantage there would be, and that is setting aside the ethical questions.

I wanted to ask you a technical question. I do not know which age it goes back to, the Pleistocene age or whatever, but we had ferns that were as big as our present trees, and we laid down the basis of our fossil fuels, which must have been from a higher carbon dioxide content in the air. How high was it then as compared to now and why are we not counteracting that with our plant growth? That is, why are we not counteracting the present higher rate, as we did back in those ages?

Dr Hare: We do not know for sure what the carbon dioxide concentration was in those days. The large size of the plants may not have indicated a high CO₂ content; there may be other reasons for that large size. There are tree ferns now growing in tropical Australia and New Zealand which approach tree size.

Mr McGuigan: At least it laid down the fossil fuels.

Dr Hare: The fossil fuels that we burn now are the cycads and tree ferns of the past, as it were. Perhaps I should say that the way we do this is to take bubbles out of the ice in Greenland and Antarctica and measure the carbon dioxide in them. We know it goes back about 160,000 years. The things you are talking about were

back, unfortunately, more than 250 million years ago and we do not have any direct measurements on which to base it.

I can only tell you that in the 160,000 years the carbon dioxide concentration has only very rarely been higher than it is at the present moment. They march almost in lockstep. When it is cold, the CO₂ is low; when it is warm, the CO₂ is high. There are people who say that the current warming is not the consequence of rising CO₂, but the cause of it. Carbon dioxide is less soluble in warm water than it is in cold water and so people say, "All you're looking at is the effect of the warming of the oceans."

My own view is that regardless of which is cause and which is effect, we know that these changes in the past—and we go back a very long way with our evidence—have always been ultimately detrimental, and I think directly detrimental at the time when they were happening. The world then comes back into equilibrium with them, but we cannot afford that length of time.

The Vice-Chair: Thank you again, Dr Hare. We most appreciate it.

Dr Hare: I wish the committee all good success in very difficult decisions.

The Vice-Chair: I do have one other announcement. The clerk of the committee asked me to remind the committee that the Chair will be hosting a dinner with the American scientists Monday at seven o'clock at the Le Rendez Vous Restaurant on Prince Arthur Avenue.

The committee adjourned, at 1536.

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Official Report of Debates

Legislative Assembly of Ontario

Select Committee on Energy

Global Warming and the Greenhouse Effect

Second Session, 34th Parliament

Monday 5 March 1990



Speaker: Honourable Hugh A. Edighoffer

Clerk of the House: Claude L. DesRosiers

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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Monday 5 March 1990

The committee met at 1015 in committee room 2.

GLOBAL WARMING AND THE GREENHOUSE EFFECT (continued)

The Chair: The proceedings of the select committee on energy will begin now. We have concurrence from the third party to begin without its second member, who will be returning momentarily.

As we are starting our sessions today, I thought that it would be useful to review in a very quick way the committee's mandate and the issues that we will be looking at over the next period of time, including the expected levels of energy demand by type and by fuel that we will have used in Ontario through to 2025; the expected levels of carbon dioxide emissions; the practical and achievable potential for reductions with the current regulatory and tax framework in the years 2000 and 2005; what kinds of regulatory tax and pricing frameworks would be needed to achieve the recommendations that were put forward by the Toronto conference last year, which added up to a 20 per cent reduction of CO₂ emissions from 1988 levels by 2005; the implications in the policies and steps to reduce emissions of greenhouse gases for Ontario's economic competitiveness; the environment and the quality of life; specific actions which could be used to reduce the net emissions of greenhouse gases; and the kinds of contributions which can be made by both the public and the private sectors to limit global warming, compared with those actions which are being taken in other jurisdictions, including our trading partners and our competitors.

The issue, as you know, is one that is charged with public concern, with opinions on one side and the other side relating to how quickly action must be taken. Ontario cannot act without considering the national and the international context. For those reasons, our hearings are being framed as they have been this week, and you all have agendas before you.

I would also like to advise you that the committee has engaged the consulting services of the Royal Society of Canada, which will be attaching to us Dr Danny Harvey, who will serve

as the royal society liaison and research analyst, and he will be involved with us through the hearings. We are very pleased with that working relationship with the royal society. We believe that their participation will assist us in bringing forward recommendations to the Minister of Energy and to the government that will be of value and practicality as we move ahead.

Our first witness today is the Honourable Lyn McLeod, the Minister of Energy, who comes to us directly from releasing a green paper on global warming, which is the initial position of the provincial government, and from sponsoring a round table on global warming this last weekend.

I think we can all say that we are delighted that you are able to appear as our first witness today to bring us up to date relating to the initial government responses. I know that you have an opening statement and that you will take questions and answers following that. You might introduce your colleague to your left, and any other colleagues you would like placed on the record and whom you want to call on during the hearings.

Hon Mrs McLeod: You certainly recognize our colleague Ron Lipsett, my parliamentary assistant, who has been very much involved with the work that we are doing in the global warming area; and from the Ministry of Energy, Paul Shervill; and Bunli Yang, who will also assist us in answering any technical questions that the committee may want to get into today.

I do appreciate the chance to be here as your first witness as you start the hearings on the whole question of greenhouse gas emissions and global warming. As you noted, we have released a discussion paper and engaged the debate in a very public way, but I am personally very appreciative of the committee's initiative in scheduling these particular proceedings, because I think that they will be a very important follow-up to our initial discussions of last week and will help to focus discussion and public attention on the problems of the atmosphere and, I believe, further the public's understanding of these very complex issues that surround the subject.

I regard these hearings as another very important step in a process of dialogue and consultation that was set in motion at the 1988

conference of federal and provincial energy ministers. At that conference in Quebec City, the energy ministers recognized a growing concern that emissions of greenhouse gases, and particularly carbon dioxide, may be contributing to a potentially dangerous global warming trend. While acknowledging some of the scientific uncertainty surrounding the question of global warming, the conference concluded that warnings of potential climatic change cannot be ignored. Action must be taken, the energy ministers felt, and Canada should lead by example.

That conference ended by establishing a task force to review a recommendation of the June 1988 conference on the changing atmosphere, which called for a 20 per cent reduction of carbon dioxide emissions by the year 2005. The report of that task force was presented to last year's conference of federal and provincial energy ministers in Toronto.

Its basic finding was that the 20 per cent target was clearly an ambitious one, but my colleagues and I agreed that we should all work towards such a reduction, building upon regional and national initiatives that we were already pursuing, measures such as increased energy conservation and efficiency and energy research and development.

My colleagues and I also agreed that considerable work remains to be done in order to improve society's understanding of the greenhouse effect and its regional impacts. Regional assessments are very important because of the very diverse roles that energy plays in economies across Canada. The national assessment carried out by the task force last year was a start, but the richness of regional differences means that the solutions, and even the approaches, may be different across the country.

We further agreed on the criterion that measures undertaken should make economic and environmental sense in their own right, and we agreed, finally, that any programs and strategies for dealing with greenhouse gases should be based on broad consultation among interest groups in each jurisdiction.

This is the path that we mapped out in Toronto last August, and it is the path that Ontario is now vigorously pursuing.

To begin with, we have made energy conservation and efficiency our top priority at the Ministry of Energy. As this committee knows, we have initiated a wide range of programs aimed at promoting a more efficient use of energy in all sectors: industrial and commercial, institutional, transportation and residential.

There is our EnerSearch program, for example, which makes money available to the private sector for the development of innovative energy technologies. One of the more exciting projects we are involved with is the development of a process here in Ontario that could have hydrogen a fuel of the future.

We also have the institutional energy management program, which promotes the use of energy-efficient technology and design in the institutional sector. To give you an idea of the kind of thing we are doing under that program, we have contributed to an innovative system for heating and cooling the buildings at Carleton University in Ottawa. The new system, which makes use of water pumped from 250 feet below the ground, is reducing consumption of natural gas at the university by a million cubic feet a year. For the university, that means significantly lower energy bills, and for the environment, reduced emissions of carbon dioxide.

I should also mention that our municipal buildings energy efficiency program, which is showing building operators how to reduce energy consumption by as much as 30 per cent, is an effective program.

Under our streetlighting conversion program, which we operate with Ontario Hydro, we have been encouraging municipalities across Ontario to switch from incandescent lighting to high-pressure sodium lighting, which of course is much more energy-efficient.

We operate a number of educational programs as well, which work with building technicians and operators, student architects, building associations, community colleges and schoolteachers to promote energy efficiency awareness on a broad front.

There is also our industrial energy services program, which helps private companies to carry out onsite energy audits, feasibility studies and project engineering design.

In addition, we are very active in the promotion of cogeneration, which reduces fuel consumption and atmospheric emissions by generating more energy from a given amount of fuel. Our cogeneration encouragement program is speeding the development of this high-efficiency form of generation in the industrial, commercial and institutional sectors.

Even then, the list of energy efficiency programs is far from complete.

Among our legislative initiatives, we are particularly proud of the Energy Efficiency Act. Under the act, as many committee members are already aware, minimum energy-efficiency stan-

dards have been established, or soon will be, for a wide range of household appliances and energy-using products sold in Ontario. They include clothes washers and dryers, dishwashers, ranges, electric water heaters, heat pumps, air-conditioners, refrigerators and freezers. Continuously burning pilot lights will also be prohibited in forced-air gas furnaces, which is a North American first.

To give you a small idea of what we expect to achieve with these new regulations, householders will save an estimated 200 cubic metres of gas on their furnaces each year and 150 kilowatt-hours of electricity on their fridges. Considering the sheer number of appliances and other energy-using products that will eventually be covered by the regulations, the cumulative energy saving across Ontario will be significant. The message of all these programs and legislative initiatives is that the government takes energy conservation and efficiency very seriously indeed.

As we move forward to address the atmospheric problems that relate to the production and use of energy, we are following the path agreed upon by my colleagues and me at last summer's energy ministers' conference, proceeding on the basis of consultation and dialogue.

Last October the ministry sponsored a workshop at which major energy users and other interest groups discussed steps that might be taken by government and the private sector to reduce greenhouse gas emissions. Then on Friday we sponsored a symposium on global warming, which brought together representatives of government, business and industry, the academic community and environmental groups, as well as ordinary citizens.

The response to the symposium left us in no doubt that there are a lot of people out there who care very deeply about what is happening to the atmosphere, and the views expressed in the various panel discussions left no doubt that, given leadership, people are ready to act on their concerns.

I regard these hearings, then, as yet another step in the consultation process. The process will continue on 2 April when I again meet with my fellow energy ministers from across Canada, and the result of these hearings will be of great benefit to me as I prepare for that meeting. Then in late spring the ministry will be sponsoring yet another public event, a workshop on limiting emissions of greenhouse gases.

All of these initiatives, together with the results of your deliberations, will contribute to

the next step in the process of consultation, which will take the form of a white paper on global warming, which we would hope to release by the end of the year.

To make sure that we continue to have the widest possible public input, the ministry has established a toll-free telephone hotline. It will allow interest groups and concerned citizens all across Ontario to communicate directly with us in order to obtain information on environmental matters and express their views and concerns.

I mentioned the symposium that we sponsored on Friday. During the morning session, my staff presented a discussion paper containing suggestions for a series of actions that might be taken by government and the private sector to start controlling greenhouse gas emissions in Ontario.

The suggestions are based on two key principles. The first is that the actions must make sense in their own right, and the actions set out in the discussion paper do that. They are mainly energy efficiency and energy conservation measures that, for a start, will reduce Ontario's energy bills. That, in turn, will make Ontario's goods and services more competitive in world markets.

Other actions are suggested as well, actions that address such environmental concerns as the depletion of the ozone layer by chlorofluorocarbons. We have also suggested tree-planting measures, which will have a double benefit. Besides helping to reduce the greenhouse effect by absorbing carbon dioxide, trees serve a very important purpose in another ministry for which I have some responsibility. In both my cabinet portfolios, as Minister of Energy and as Minister of Natural Resources, I am very interested in seeing more trees planted, in rural areas and in cities and towns, as well as in areas we are already reforesting.

The second key principle underlying the suggestions in our discussion paper is that responsibility for controlling the environmental effects of producing and using energy should not and cannot be borne by government alone. All sectors of society have contributed to the problems of the atmosphere and all sectors bear their share of responsibility for helping to solve those problems.

When I say that the effort to control greenhouse gas emissions must be based on partnership and shared responsibility, I am not thinking of Ontario alone. The partnership must also be a national one. We count on Ottawa to match the steps that are being taken by Ontario and the other provinces with appropriate action at the federal level.

In addition to a provincial partnership and a national partnership, the effort to do something meaningful about the problems of the atmosphere requires and demands an international partnership. Ontario is responsible for only about one per cent of the world's annual greenhouse gas emissions. Canada as a whole is responsible for only about 2.5 per cent. Quite obviously, we cannot solve the problem by ourselves. It must be an international effort, and here we look to Ottawa once again. As a peacekeeping nation, Canada has earned a position of considerable trust in the family of nations. Ottawa is therefore well positioned to take the lead in negotiating an international agreement on greenhouse gas emissions. Nothing less will do.

In the meantime, we must continue with our efforts here in Ontario. An important part of that effort will be to make the public aware that we are all part of the problem and all, therefore, part of the solution. Your hearings will help to achieve that.

I would be happy, along with staff from the ministry, to answer any initial questions the committee might have.

1030

The Chair: Thank you very much, and I would also like to thank you for the courtesy that you extended to the members of the committee in inviting them to participate in the symposium. I know that several members were able to attend the sessions, and I know that they would have found them quite invigorating. I was interested in the *Globe and Mail's* report on the symposium, which said: "The range of views on the issues illustrate just how difficult it will be for government to tackle the problem. Global warming is an issue that is completely intertwined with production and economic growth."

I am sure we have some questions on those matters arising from your remarks and from the symposium, and Mrs Grier is the first questioner.

Mrs Grier: My first question is about process, which the minister has elucidated to some degree, but I want to be really clear as to where this committee fits in and whether the deliberations and the establishment of this committee—it appeared to be a very independent thrust, from what was going on internally, and then suddenly your green paper emerged. Can you just take me step by step to what has to happen until we get to some action on the issue.

Hon Mrs McLeod: Surely, and I would also ask the chair of the committee to contribute as well to the answer, because I think what we are doing is evolving a way of both engaging the

debate and working at what specific action steps can be taken. There is, I think, confusion in the public mind, as well as a variety of perspectives on what the nature of the problem is as well as what steps could be taken, so we think there needs to be a widespread discussion in a number of forums.

We debated about the release of the discussion paper, and I want to stress that it is very much a discussion paper. It really does not have the status of a position paper at this point in time, because it really is a trigger for the discussion. I think what we wanted to do with the discussion paper was to raise the issue of the problem, the nature of the problem, the kinds of steps which could be considered, the whole issue of targets, how achievable are the targets, and put that whole set of issues out for public discussion.

I think that in the work the committee does, as well as, at this point, the committee following up the release of the discussion paper, you will use that discussion paper as a basis for your deliberations. You may feel that it does not go far enough in many areas. It certainly may not be all-inclusive of all the issues that the committee would like to address. You may find that with the witnesses who come before the committee new areas are opened up, and we would certainly want to incorporate those deliberations and recommendations from the committee in the next steps of public consultation, as well as towards the white paper.

Mrs Grier: For the white paper, which you indicate you hope to have ready for release by the end of the year, would you then be looking for recommendations from this committee? Our original target had been the fall of 1990. Does that fit in with your desire to have a white paper ready? When do you need to hear from us?

Hon Mrs McLeod: I think that the date of the fall of 1990, as we had discussed with the chair, would fit very well with our expectation of being able to have a white paper by the end of the year.

Mrs Grier: Then how long do you think a white paper has to be out there being discussed before we move to do something?

Hon Mrs McLeod: I suppose to some extent that may depend upon the nature of the paper and the recommendations that are in the paper and the degree of consensus that is arrived at over the course of the discussions in the next year. We truly are at a beginning point, I think, and it is difficult to know exactly where the process will lead us by next fall and by the end of the year.

Mrs Grier: I guess I find it hard to believe that there is not a consensus, that changes to the

building code and planting more trees is not the subject of a fairly broad consensus within Ontario, Canada, almost the world at this point. Do we need a white paper to discuss that and then a decision on when to implement?

Hon Mrs McLeod: No, we do not need a white paper in order to proceed to take steps that we know are important in their own right for a number of reasons. In fact, as I suggested in my opening comments, I think there would be a very broad consensus that measures that address energy efficiency and conservation are important to be taking and will in fact be significant in addressing the global warming effect, and we are taking those kinds of steps. We are certainly looking at the whole issue of forest regeneration for a number of reasons, including the fact that it has a positive environmental effect. So there is much that we can be doing in the meantime. I do not think that would in any way preclude the deliberations of the committee or the participation in public forums, because I think there is a broader awareness that needs to be achieved, and there may well be a consensus that develops for taking steps beyond what we are currently pursuing.

Mrs Grier: The measures that you have outlined to us today, the Energy Efficiency Act and all the things that the government is really engaged upon, have those been quantified in any way? Could you tell us what contribution those measures that you have already embarked upon are making or you anticipate will make to the whole issue of greenhouse gases and global warming? If we are looking at 20 per cent as a target, presumably everything we do must be measured as to what its contribution is towards reaching that target. How much of that have you done within the ministry?

Hon Mrs McLeod: It may be early in your deliberations to have that kind of testimony, but I think I could ask either Paul or Bunli to make some comments on some initial analysis that we have done of looking at, in a quantitative way, what would need to be achieved in order to reach different targets and how far, for example, the initial action steps that we have suggested could be pursued would take us towards different targets. I think that is going to be a subject of some interest as you proceed with witnesses at your hearings.

Mr Shervill: I think there has been a fair amount of research done in the ministry on trying to quantify the contributions made by a number of ministry and other initiatives as well, with respect to their contribution to the reduction of

greenhouse gases. I think perhaps the minister is right, that there would be an appropriate time for the ministry to come and present some evidence on the quantifiable results from those. I do not believe we have come prepared today to give you that information, but it is something that could be readily assembled and presented to the committee.

The Chair: Mrs Grier, officials from the Ministry of Energy are appearing before the committee on Thursday as witnesses. That may be an appropriate time for them to comment further on your question, which I believe is a good one as well.

Hon Mrs McLeod: The committee might well be interested in some of the work that was done by the provincial-federal task force that Bunli in fact chaired, appropriately. They did quite a bit of assessment work, not only in Ontario but nationally. That might be of interest to the committee as well.

Mr Charlton: I have a couple of basic concerns about what I hear being said. I do not think there is anybody who can quarrel with a public consultation process or an attempt to find a consensus approach to the kind of problem we are trying to deal with here in terms of global warming. On the other hand, any public consultation process we go through will deal with a range of companies, public interest groups, parts of the science community from our universities, trade unions, and the kinds of people who were represented at your seminar on Friday, but there will be no thorough consultation with the largest number of our industries and other public groups and organizations out there, some of which will be co-operative in whatever gets decided, others of which will not.

For example, there was one comment at the seminar on Friday that I think puts the whole thing in perspective. It was a question from the floor, from one of the company representatives, and I cannot even remember his name now. Essentially what he put to you or to your staff—I cannot recall if you were actually at the front then—was that in terms of issues of energy, energy investment and even energy efficiency that is cost-effective, a company's readiness to invest in that kind of cost-effective efficiency depends on a whole range of other investment priorities. In other words, even if it is eminently cost-effective, if they can take that same money and get five per cent more doing something else with it, then the cost-effective energy efficiency measure does not occur.

I guess what I want to hear that I have not heard at all from you or any of your ministry people so far in this debate is what is your intention at the end of this consultation process, this "Let's develop a plan" process. Will we see tough program regulation to ensure that whatever we decide in fact occurs?

1040

Hon Mrs McLeod: When you ask what is our intent at the end of this consultation, you are asking me that question as we begin it.

Mr Charlton: I do not want to know specifically what the regs will be. You have heard five or 10 or 15 companies say: "Yes, we think that would be a good thing to do. If everybody did that, that would certainly help the problem." What I want to know is how prepared you are to do what has to be done to make sure that not just those five, 10 or 15 companies do that nice little thing, but that everybody else out there does it as well, because the hope that everybody else will do it is just not good enough for the problem we are trying to deal with here.

Hon Mrs McLeod: Obviously there is a commitment to dealing with the problem when you launch the kind of consultation and discussion that we are launching at the present time and that the select committee is participating in. So my intent, the government's intent, would be to take the steps that are clearly understood and agreed to be the steps that are in the best interests of dealing with the problem. I would not want to speculate in advance of the kind of discussion that is going to take place as to what those steps are, but I would very strongly suspect that they will continue to be a mix of incentives, education and regulatory actions that are recommended. Those will likely be cross-ministry as opposed to single-ministry, because we know we are involved with a great number of sectors, and they will also be private as well as within government. I think within that general framework there is certainly an intent to take action. The specifics of the action I would not predict.

Mr Charlton: You have just addressed two specific things that raise this concern I have. The first one you mentioned in your opening remarks. You mentioned the Energy Efficiency Act and the fact that the ministry has adopted energy efficiency as its top priority. In the course of making those comments you gave several examples. I only caught and jotted down the one, which was fridges. As you know, that is a pet one of mine.

You mentioned a regulation which, in effect, once the regulation is in place and the time lines have evolved, will mean an average saving of 150 kilowatt-hours per year for a new fridge over and against what we have now. If energy efficiency is really our top priority, not just one of the top, but our top priority, we should be looking for between 400 and 500 kilowatt-hours per year of savings. So when I see a regulation coming from your ministry that implements considerably less than half of what we should be targeting if it is our top priority, I get concerned about what the real commitment is and how well we are really going to do this task if we undertarget everything. I would like your response to that.

Then I have one other example. It is an interministerial one, so you will have to respond in a different way or I would make it all part of one question.

Hon Mrs McLeod: I guess my response would be that on specific regulations, those in turn are the result of a fairly high degree of consultation and a phasing in of the regulations that are manageable, but there is a move to have regulations that are truly in the forefront of regulations. If the committee, in deliberating some of the measures that are related to the greenhouse gas emissions and into the areas of energy efficiency regulation, feels there is more that can and should be done, then that is something we are obviously going to take very seriously. I think one of the roles of the committee is to review what we have been doing and to say to us that they are either the right steps in the right direction or that something more—

Mr Charlton: Just in that respect—I throw this out for you and your staff in terms of future discussions around things like efficiency standards under the Energy Efficiency Act—when I was preparing the document that I released before Christmas, we met with a number of trade unions. We also met with one of the companies, officials from Camco. When we were having our discussions with Camco about the project, right in the middle of the meeting, when I suggested what the intent was, which was to put energy-efficient fridges on the market in Ontario that were not on the market now, the president of Camco said to me, "Well, yes, we could get down to about 80 kilowatt-hours a month," and I said, "No, I'm talking about 38 to 40 kilowatt-hours a month." He looked up and said, "Oh, you're talking about state of the art."

We have to start understanding what it is you are consulting about when you are out there

trying to do your public consultation in terms of regs around matters like this, if you want to get all that you can get in terms of dealing with what I think we are all saying is the most important problem we have to face.

Hon Mrs McLeod: I think that the people in the Ministry of Energy who have been carrying out the consultations specifically on the energy efficiency regulations are very much aware of what is state of the art in other jurisdictions and are looking at achievement of state-of-the-art regulations, but at the same time phasing those in in such a way that the Ontario markets can adapt to that and can in fact reach the point where we can be the providers of those energy-efficient appliances.

Mr Charlton: Just one last point: I have a situation in my own municipality, and it is probably happening in a number of other members' ridings, although I am not positive, because we have some rural stuff here. But at any rate, we have a transit system in Hamilton called the Hamilton Street Railway. Presently they run a significant number of electric trolleys. The Ministry of Transportation, as you are well aware, has been doing a fair bit of work over the last number of years around alternative fuels, probably some of that in consultation with your own ministry. As a result of the work they have done, for example, with running vehicles on compressed natural gas, they are no longer encouraging municipalities to use electric trolley buses. I understand the decision in the Ministry of Transportation is around natural gas as an alternative fossil fuel to other fossil fuels.

I do not in any way, shape or form comprehend, with the direction you are being forced to head in with this global warming question, watching not only the loss of electric buses, but the overhead infrastructure, which is very costly and which if let sit for a decade without being used will be totally decayed. I cannot comprehend how we are allowing one ministry to do what it is doing around electric trolley buses when your ministry is charged with the task of trying to find ways to reduce the use of fossil fuels. They are going to increase it by their actions and lose an infrastructure in the process that we will not be able to easily replace.

When are we going to start seeing some of the co-ordination, at least from the perspective of your putting out something that says, "Hey, whoa, don't make any stupid decisions like that until we get a handle on exactly where we're going, and it's going to take us a couple of years"?

Hon Mrs McLeod: Let me, in a very preliminary way, suggest that there has been a great deal of interministerial discussion and the release of a discussion paper, so that other ministries are in fact recognizing that they have a significant role to play in dealing with the global warming problem. I would also hesitate to suggest that this has been the first of the interministerial discussions. Paul, you might want to comment on some of the ongoing work, specifically with the Ministry of Transportation.

Mr Shervill: If I could just respond to a few of the points, I think the Ministry of Transportation's initiative with respect to CNG buses has been more one of trying to remove diesel-powered buses from the urban setting than one of trying to phase out trolley buses. In fact, trolley buses are still very—

Mr Charlton: They have cut the subsidies on trolley buses.

Mr Shervill: I guess trolley buses are very expensive. They are also users of electricity at peak times, and you have to also consider where that electricity comes from in terms of the greenhouse gases that are produced by the production of that electricity. I think it has become a debatable issue. So I think their motivation is not one of trying to phase out trolley buses; I think it is trying to replace buses in the urban setting that are currently emitting diesel fumes in the downtown area.

1050

Mr Charlton: Their policies are going to cause the phase-out, so perhaps you could suggest to them that they just slow down a bit until we figure out where we are going.

Mr Shervill: Yes, we have been having some ongoing discussions.

Mr Charlton: Local committees are considering all over the place whether to replace the buses they have or get out of them altogether because of ministry actions.

The Chair: Do you have more to add relating to Mr Charlton's comment?

Mr Shervill: I think only to suggest that we have been having ongoing discussions with the Ministry of Transportation with respect to the efficiency of use of transportation vehicles and the fuels, of course, that they use. We hope to continue those discussions this year.

The Chair: I would just like to add, at the conclusion of Mr Charlton's remarks and in the direction that he was going in, that I hope this committee would come forward at the end of our

hearings process with recommendations and analysis relating to achievable dynamic public policy proposals that are very much a part of this whole area, including recommendations regarding the implementation of those proposals. I think we therefore have a fairly heavy agenda ahead of us.

Mr Cureatz: I apologize for just stepping out for a moment. I hope Mr Charlton has not covered the one ground that I am interested in. Minister, I think you and I had a discussion on this before. I know the committee had discussions about the role of the energy committee, which I applaud the government for. I think it is very worth while. There will be a lot of work to be conducted by this committee, no matter who the members will be.

We had discussed, and I would like to have your views on the record again, the co-ordination between both the Ministry of Energy and the Ministry of the Environment. It seems to me that, with the large mandate before this committee, there is such large overlapping that it should almost be that the committee should be the energy-environment committee in its examinations of the greenhouse effect. To me, it seems that the Ministry of the Environment should be involved.

Have you spoken with the Minister of the Environment? Have your ministry officials spoken with his ministry officials? Do you not think that they should be included with this committee, and if not, how do you look at the perspective that it seems, to me, to be lopsided, with the energy committee solely looking at the environmental effect without taking into consideration too the Environment ministry?

Hon Mrs McLeod: I am sure that if the committee wished to ask the Ministry of the Environment people to be present, either as witnesses or for ongoing parts of the committee's deliberations, the Ministry of the Environment would be willing to consider that. I have no question about the co-ordination that is necessary between the Ministry of Energy and the Ministry of the Environment, as well as a number of other ministries, when we deal with the whole question of global warming. That is quite clear and that has been ongoing as we both developed a process for beginning the consultation leading towards a white paper and also the release of our own discussion paper. It is also a factor of the Ontario Round Table on Environment and Economy, where both the Ministry of Energy and the Ministry of the Environment are represented.

There is a co-ordination that takes place there as well.

Having said that, I think it is quite appropriate for the committee to feel that it would like a more active involvement of the Ministry of the Environment and to make that suggestion. I do feel very strongly that it is important for ministries other than the Ministry of the Environment to indicate quite clearly that we are concerned about the environmental impact of the policies and practices that we are involved in. I think it would be truly regrettable if it were only the Ministry of the Environment that was seen to be responsible for environmental concerns. So I think it is quite appropriate for both the Ministry of Energy and the select committee on energy to be looking at the environmental impacts of energy use. To me, it is quite appropriate for the committee to continue as the select committee on energy and to be dealing with energy matters that clearly have an environmental effect.

Mr Cureatz: I somehow beg to differ. To me, we are working in isolation on a whole area of energy without bringing along—and of course, if I make the proposal to the very lopsided—should I get into one of my backbencher speeches?

The Chair: No.

Mr Cureatz: No, I should not.

Interjections.

Mr Cureatz: Let's talk practicality.

Mr Callahan: Do not exhaust your energy.

Mr Cureatz: If I get into a great big lambaste about this lopsided, Liberal-dominated energy committee, all of whom I have nothing but the greatest respect for—they are all wonderful individuals, most of whom will not be back after the next election, but that is for another speech at another time.

Mr Callahan: You are emitting CO₂, Sam.

Mrs Grier: Say it ain't so.

Mr Cureatz: The point of the matter is, I mean, if they had given their marching orders, oh great.

I suggest, as I have had to before, that somehow the Ministry of the Environment should be involved in this. There is great shuffling of feet, lowering of heads, casting of eyes to the ceiling and the decision is annulled. As a result, I have had little influence.

I am just sort of laying the groundwork for you that we tried that once. We were not too successful. I am still a little confused about why we are operating in a vacuum, with the Ministry of Energy, looking at the global aspect, global

warming, and not taking in, I think, consideration of a joint committee of Energy and Environment. But of course, I am a Conservative backbencher in third place. What do I know, right?

In any event, we will save this for further discussion, either a new committee or in the House.

Mr Callahan: I am curious. First of all, I would like to congratulate you, as Minister of Energy, on this committee being struck. It really is leading the pack, and this obviously is something that Ontario cannot solve itself, but it requires somebody to start the ball rolling. I think we have done that.

Having said that, this may be a whacko question, but I have to ask it: Has anybody determined why CO₂ traps heat? Is there any scientific investigation into why that happens?

The second question is, since we know that, through photosynthesis, carbon dioxide is returned to a gas that would not cause these problems, and since we know how photosynthesis operates, maybe somebody here who is scientific can tell me, has there been any investigation into attacking the major emissions of CO₂ by some mechanical method of photosynthesis, and if not, why not?

It seems to me that what we are doing is attacking the issue from the back side as opposed to front side by saying there are major increases in CO₂ out there that are causing problems for some parts of the world. If you want to really be greedy, I guess for Ontario it would mean that our chairman would not have to go to places in the sun, she could stay right in Ontario and get the same delightful tan, yet other places which are not industrialized, that are perhaps Third World countries, will be devastated by it because of the increase in temperature.

Maybe somebody could answer those questions, or has anybody ever raised them?

The Chair: If I could just interrupt for a second, as you know, over the period of the week we indeed have some substantial scientific witnesses. The minister and her officials may want to tackle some of these questions, but we do have in our audience this morning Professor Richard Somerville, from the Scripps Institution of Oceanography, and Rodney Fujita, from the Environmental Defence Fund in New York, both of whom will be appearing later on this afternoon. You may want to reput the questions to those witnesses or to other witnesses later on in the week.

Mr Callahan: I knew they were coming. I just thought I would throw them out so they could think about them over lunch, and maybe somebody does have an answer to that.

1100

Hon Mrs McLeod: Can I just make two very quick comments in response to Bob's first question? The first is that I can almost feel Dr Yang being anxious to address the scientific questions that were raised. Please feel free to invite him back and pose those questions again. I can assure the committee that, in addition to your other expert witnesses, he is a tremendous resource of knowledge in this field from the scientific perspective.

I would not pretend to be able to respond in that way. I have come into this very much as a nonscientist learning about the issue, and one of the things that struck me in your comment about the regional differences, the differences in the regional impact, is a sense that initially approaching the question, you think, "Well, a little bit of warming in some regions might not be totally undesirable." Coming from northern Ontario, I suppose that was one of my first reactions.

What I think I have come to understand is that there really are not regional winners if we look at the potential impact of a global warming effect. While there are uncertainties about the magnitude of the effect, it would seem that the warming trends that would come would bring, for example, in northern Ontario perhaps slightly warmer weather, but also a considerably greater dryness.

Interjection.

Hon Mrs McLeod: Exactly, less water, more fires, which would deplete the forest resources. There are regional differences in the way in which we may be able to respond, but there are probably no regional winners in terms of any effect that global warming might have.

Mr Callahan: Okay, I will save those questions, the scientific ones, for maybe this afternoon or later on.

Mr Pollock: I just want to thank the minister for the invitation extended to me to attend the symposium on Friday. I found it very interesting, and there were quite a few questions asked there. I wanted to get on with a particular question but did not get the chance. However, I checked with some other people there and they gave me one answer. I just wondered if you would verify that answer. You mentioned trees here this morning, that they absorb and reduce carbon dioxide in the

air. Now, trees are not really that much different from a lot of other crops. Do other crops absorb quite a bit of the carbon dioxide?

Dr Yang: Certainly. All growing biomass—it is a jargon term for things that grow—will store carbon. The good thing about trees is that they store the carbon for years at a time. The jargon word for that is “sequester.” So if you were talking about growing grass or wheat or things that are cultivated each year, yes, they do store carbon, but then the carbon comes back into the cycle and it is reused again and eventually—very quickly—gets back into the atmosphere. With trees, as they grow, they photosynthesize and make use of that carbon and store it in the wood. So if a tree stands for 30 to 50 years, you have delayed the release of that carbon into the atmosphere for about 30 to 50 years. Trees are very good absorbers in their early growth, when they are young and growing. With mature trees, it depends on the species, but after five or six years they are really stabilized in terms of the storage of that carbon. But there may be international experts who are more expert than I on this question of balance and time intervals in storage of carbon.

Mr Pollock: Okay, but there must be a difference between crops too. For instance, there must be quite a difference, I would think, between legumes and just straight grass or other field crops. Would that not be right?

Dr Yang: Yes, but as I say, in terms of the time scale they are all sort of like less than two years, between a year and two. For example, water hyacinths are very good absorbers of CO₂, but then again you have to do something with those water hyacinths, as they die after about six or eight months, or else they just simply decay and emit CO₂ again.

Mr Pollock: In other words, you are saying that even when they decay they make the CO₂?

Dr Yang: Yes, or when they are used or consumed, in the case of vegetables like legumes.

Mr Callahan: You are creating CO₂ as well.

Hon Mrs McLeod: It is an interesting question in terms of different crops. The committee may also find that they get into the issue of different kinds of trees and the differential impact that different kinds of tree plantations would have.

Mr Pollock: Just following that along, are evergreens better or worse? How do we rate them?

Dr Yang: This depends on where the trees get planted and where they are sort of applied. I know that sounds evasive, but what I mean is that in the urban areas, tree planting can help beyond just the CO₂ absorption, because they can help reduce air-conditioning needs. In rural areas, they can also help as wind-breaks and as soil erosion prevention mechanisms as well as CO₂. This is following the minister's comment about doing things that are worth doing in their own right, not necessarily just economic, but more than that, environmental protection and aesthetics as well.

In the north, in our boreal forests, certainly it would more likely be the evergreens. In the southern areas, in the urban areas, you would be looking at a mix, probably, of evergreens as well as deciduous trees. So it depends on location and application. Douglas fir, for example, and pine are very substantial absorbers of carbon. There is also talk of carbon gulpers—fast-growing poplars—that might be used along highways, along roadsides.

Mr Pollock: How serious is this problem of global warming when we just had the coldest December on record?

Hon Mrs McLeod: Let me take, again, a layman's first approach to that, because I think that will be a focus of a lot of discussion for your committee, the question of the magnitude of the problem and the degree of scientific uncertainty about the magnitude of the problem.

One of the things that I have discovered is that there is uncertainty but that there is a trend towards warmer temperatures over a longitudinal period. But we cannot simply look at weather effects and say that a cold December is proof that there is no tendency towards warming, because one of the potential effects of a global warming trend is real fluctuations, extreme fluctuations in temperature. It is quite possible that is what we have been seeing, if it is consistent with the global warming trend. But I think that will be a focus of a lot of discussion for the committee.

Mr Pollock: This is more or less an environmental question, but we get into the situation of burning garbage or placing it in landfill sites. Of course, I happen to notice in some of the documentation on putting it in landfill sites that you get a far greater degree of methane gas off landfill sites than from any other procedure. What are your comments on that?

Hon Mrs McLeod: Again, the technical people who have done some greater analysis of this might want to comment, but certainly we recognize in our discussion paper that there is a

concern about methane gas released from landfill sites and that this is one of the contributors to the greenhouse gas concern. I suppose it becomes a question of balancing again. As you look at what the alternatives are for waste management, there are some which would clearly seem to be particularly benign, in the sense of recycling, for example. There are other areas where there would be some level of emission and you would have to raise the question of what the balance is in terms of the environmental impact of those different methods of management.

I do not know whether anybody would want to comment in more technical detail at this point or not.

Mr Pollock: Some jurisdictions claim that they have built incinerators that are environmentally safe. What is your opinion on that?

Hon Mrs McLeod: We have an energy-from-waste program within the Ministry of Energy, which is premised upon our belief that there is a legitimate energy-from-waste approach to waste management as one component of a full waste management program—certainly not one which we would see as being competitive in any way with recycling, which I think we all agree is the most benign and desirable management approach, but as an additional, as a supplementary program, energy-from-waste programs can be carried out in ways which are environmentally sound.

Mr Pollock: They can be burned in ways that are environmentally sound?

Hon Mrs McLeod: There are energy-from-waste programs which can be carried out in ways that are environmentally sound. That is not to say there are no emissions when you have an energy-from-waste program, so again, you would have to be looking at, what is the balance? If you are deriving energy from waste, are the emissions, the environmental impacts of that particular form of deriving energy, less than the environmental impacts of other energy forms that would be used?

For example, you would be looking at a wood waste program in relationship to replacement of natural gas fuels and you would obviously then have to look at the technology through which that program is being carried out, because some forms of technology will be environmentally much sounder than others.

I think it is a fairly complex question. Obviously, with any of our energy-from-waste applications, we have to go through an environmental approvals process and those kinds of technical questions in relationship to their

emissions and environmental impact are looked at very closely.

1110

Mr Pollock: Apparently there is an incinerator in Burnaby, BC, and they claim that it is environmentally safe and meets all the standards as far as being environmentally safe is concerned. What are your comments on that?

Mr McGuigan: Looking over the package you gave us this morning, and also previous sessions in the energy committee, we have an awful lot of information on ways in which to save energy through the Building Code and how we manage our homes and manage our businesses, public buildings and so on. Progress is being made, and I see it accelerating.

I was standing waiting for a taxi in one of the local hotels. The marquees have 200 or 300 spotlights under them. I noticed that they were all the new fluorescent type of spotlights, the Philips. Just as a little aside on that, Hydro has a program where it is advertising those types of bulbs, and they are supposed to be available through the local co-ops, except that my co-op does not have any. I am just wondering if you might find out about the availability of it. Perhaps they cannot get enough of them from Holland or whatever.

But that was not my main point. My point is that an awful lot is being done and gradually, over time, is being taken up, perhaps not as fast as many of us on the energy committee or yourself would like to see, but nevertheless it is going on.

There is an area that others have touched on. You wonder whether any forward thought has been done in this regard, and that is in transportation. When you think of the tremendous highway-building program we have and the increasing number of vehicles we have on the roads, which are contributing to all sorts of problems, not just environmental—I am looking at Highway 401 and I guess, perhaps, to do some forward thinking, is the ministry looking at the future as to—I am wondering if that some day might be electrified. The question remaining, of course, is, does that actually make us any gains in the use of energy and also the matter of the environment?

I could see in my own sort of futuristic mind where you might have cars travelling on the paved section, local movement of vehicles on the paved section of the 401 and perhaps you have, to the side or overhead, electrified railways. Is there any thinking being developed in that area? We know that actions are a long way behind the

thinking, but you have to start the thinking. That is one question regarding transportation.

The other, and it affects mainly the greenhouse effect, carbon dioxide and nitrous oxide, is the use of natural gas as a fuel. Union Gas, which is headquartered in Chatham, in the riding adjoining my riding of Essex-Kent, has a program now. I think the number is 100: They are putting out 100 small compressors to selected people where-by they would slowly fill their tanks, largely overnight, which I believe has some beneficial results, actually, in the balance of electric power. When less power is being used by lighting and industry, these electric-powered pumps would fill your tank.

I wonder why we are limited to just 100 of those compressors, why we could not have an industry here in Ontario building compressors. I do not know where these compressors come from, whether they are made in Canada or in some other country, but it is a bit of a puzzle as to why you have to be—I do not know whether you have to be a very important person, or what you have to be, to get one of these compressors. It seems to me we should be pursuing that, not only as a matter of energy, but as a matter of industry. Why could we not have a manufacturing process here in Ontario to make those things? Especially in southwestern Ontario, and I guess over most of Ontario today, we have gas distribution lines and in fact they are expanding very rapidly.

I really have two questions in regard to transportation; that is, the future of our highway system and also the use of natural gas. I heard our friend Brian talking about alternative fuels in the city. I guess I tend to agree with him, except that in the city you do have that added dimension of an environment and people's health perhaps overrides even some of the considerations about the proper use of energy.

The Chair: Mr McGuigan, I wonder if the minister could comment now. We have two more questioners. I am going to have to ask them to be short because the minister does have a speaking engagement today with the Municipal Electric Association. We would like to ensure she is there on time, so she can give them the energy efficiency rules.

Hon Mrs McLeod: I will make just a brief preliminary comment and then ask either Paul or Bunli to comment on the specifics of any discussion of electrification as well as the gas compressor question.

There is certainly no doubt that the Ministry of Transportation is looking very seriously at the whole issue of how more public transportation

use can be encouraged so that we do deal with the issue of a tremendous amount of transportation use and the emissions from the private vehicle use on the highways. It seems to me that is one of the best illustrations of why the kind of public consultation process that we are engaged in is important, because clearly there are steps the government has to take to provide that encouragement and the wherewithal to make increased public transportation possible. But there also has to be a substantial buy-in from the public that this is a necessary change in lifestyle. I think the two things work hand in hand, but I know the ministry is looking at alternatives. I am not sure about electrification specifically.

Mr Shervill: High-speed rail has been looked at generally. Whether it would be on Highway 401 or other places is a question the Ministry of Transportation is actively considering, how to enhance the use of public transit in the Metro area.

On the issue of the smaller compressors, also known as the residential refuelling appliances, I guess we started this program a couple of years ago with only 50 of them in Ontario, because it was a piece of technology that was being developed, not only for its opportunities for cost savings for the consumer, but also because of somewhat lower emissions of carbon dioxide and volatile organic compounds from vehicles running on natural gas. The 100 compressors you are talking about in the Union Gas territory are a second-phase marketing demonstration project that the ministry and others are funding, with a total of 400 in the province of Ontario. There are another 400 or so in British Columbia, a total of about 2,000 around the world.

It is a new piece of technology. For Canada it is being developed and sold under the name Fuelmaker, which is a consortium, Sulzer Canada Inc, BC Gas and a Salt Lake City partner being the three major parties to the development of this piece of hardware. We hope that if the marketing demonstration goes well, it will be available to consumers through their gas utilities as a lease item.

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Mr McGuigan: Where are the things made? Are they made in Canada or imported?

Mr Shervill: They are actually made in Mississauga, and they are assembled in British Columbia.

The Chair: We tried to get them to locate in Halton Centre, but it did not work.

Mr Kerrio: We would be remiss if we were not to acknowledge a major contribution by this minister in her other responsibility as Minister of Natural Resources, having taken an initiative with our firefighters to reduce to a great extent the amount of emissions that would have come off that fire at Hagersville, and not only to reduce the emissions but to prove maybe to many people worldwide that we in Ontario and in the Ministry of Natural Resources have the finest firefighters anywhere. I think that is a great credit. I am sure I would like to have that message conveyed to the firefighters. In fact, in this case it has made quite an impact on the reduction of emissions that, as other jurisdictions have described, could have gone on for many, many months.

The other thing I want to just put on the record—I think it is very important—is the kind of comment made by Rich Taylor, chief engineer for General Motors, when he talks about being careful about draconian standards for vehicles that would be disruptive to the industry. That is a real disappointment to me, because quite a number of years back the United States, from where we have taken the manufacturing of automobiles into Canada, made a commitment under a program called CAFE. I cannot tell you what that stands for. The directive from the American government was that in five years all the major automobile makers were going to have to reach certain standards to cut back on fuel and to increase fuel efficiency. It seems to me that only one major automobile manufacturer met the criteria, and that was Chrysler. Rather than enforce that whole regulation—this is an impact from the other side—because fuel prices came down, a major contributor to these problems we have, they decided to look the other way and decided that they did not want to pursue tough regulations.

I have no feeling about the credibility of a whole industry that would just abandon a major program that would have naturally spilled into Canada, into our manufacturing of automobiles, and developed tremendous efficiency in the whole industry. While that comment was made, I think a message should flow back to them that, given the opportunity, they did not see fit to acknowledge that they should be looking at the impact of the emissions worldwide by the auto makers. That is coupled together with what appears to be a new look at emissions from plants like the ones out west now where they are stopping a major plant being built for pulp and paper bleaching; they are going to take another hard look from the environmental side.

I think that, in carrying on that responsibility through the Minister of the Environment and the ministry here, we are going to have to tell those people who want to take this way out that this certainly is not going to be allowed and we are going to have to make difficult decisions about regulations and how we go forward with alternative fuels and all those things being considered. That is a major disappointment to me and, I am sure, most people in energy who felt a commitment was made and is not being kept.

As you have said, Minister, it reaches across the border. If we cannot get a major manufacturer, and now the chief engineer of General Motors, to acknowledge that it can be done and should be done, we have got a bit of a battle on our hands.

I have no questions, just the comment.

Mr D. R. Cooke: I will pass because my question merely had to do with feeding Mr Cureatz's red herring, but while I have the floor, I would remind Mr Pollock that Dr Hare indicated to us that 1989 was one of the four warmest years in the last 10,000 years, with a mean temperature of 15.6 degrees Celsius, even including the coldest December on record.

The Chair: Minister, I would like to thank you and your officials for joining us this morning. I think that we have had more than the time you had expected to be here with us, but I am pleased that we were able to get as many questioners on the agenda as possible. We are looking forward to having Dr Yang and other people back on Thursday to discuss perhaps more of the technical aspects relating to the ministry's approach. We would like to thank you very much for taking the time to be with us and we hope we will be able to have some very strong recommendations for you and other ministries.

Hon Mrs McLeod: Thank you very much. I will be following the deliberations on an ongoing basis with a lot of interest as well as looking forward to the final report and recommendations.

The Chair: Before we break for lunch, I would also like to add a word of thanks to the clerk of the committee and our legislative researcher, Lewis Yeager, who, working with Dr Harvey from the Royal Society of Canada, has, I believe, put together quite a remarkable list of witnesses for us to hear from over the period of a week. The co-ordination of the scheduling and transportation and so on is something I know the committee would like me to convey appreciation for.

The committee will adjourn now until two o'clock this afternoon. I hope that we will be able to start promptly at two with Professor Richard Somerville as our first witness.

The committee recessed at 1127.

AFTERNOON SITTING

The committee resumed at 1405.

RICHARD C. J. SOMERVILLE

The Chair: We have two witnesses for this afternoon's proceedings. The first is Dr Richard Somerville, who is professor of meteorology and chairman of the climate research division at the Scripps Institution of Oceanography at the University of California.

Just as background, Dr Somerville received his PhD in meteorology from New York University in 1966. Since that time he has earned recognition as an expert on the greenhouse effect and global climatic change. By 1971, Dr Somerville was placed in charge of atmospheric modelling at the Goddard Institute for Space Studies in New York City, during which time he also taught at Columbia University and New York University. From 1974 to 1979, he led the numerical weather prediction section at the National Center for Atmospheric Research in Boulder, Colorado.

Since 1979, Dr Somerville has been professor of meteorology at the Scripps Institution at the University of California. He leads a number of climate researchers and teachers in courses in atmospheric dynamics and numerical modelling. His current research interests include the predictability of monsoons and the effects of clouds on climate.

I know that we all welcome you, Dr Somerville, and we will be very interested in your presentation.

Dr Somerville: I am very pleased to have this opportunity to talk to you. I am going to try to summarize in about half an hour the broad-brush scientific consensus of what we now understand about global warming, and I am going to do my best to make clear, as I go along, what seems on pretty firm ground and what is more conjectural and speculative. I am aware that all politicians would like to see a one-armed scientist who does not say, "On the one hand it might be this; on the other hand it might be that."

At the end, I am going to leave about half of my time for questions. I learned a lot this morning listening to the give and take, and I am looking forward to discussion with all of you. I have brought some slides along.

I am going to start out answering one of the questions I heard this morning which was, how does carbon dioxide trap heat and how sure are we of that? This sketch illustrates the green-

house. The atmosphere does act very much like a glass that will let through sunlight—that is the yellow arrow on the left-hand side—but that will trap heat that would otherwise escape into space. The gases that do the trapping are not the major constituents. They are not the nitrogen and oxygen that make up 99 per cent of the atmosphere. It takes a molecule with three atoms like carbon dioxide to absorb energy in the infrared.

The best demonstration of how that works, I think, is to look at the difference between the earth and the moon. The earth and the moon both get their heat from the same source. They are both about the same distance from the sun and yet we know that they have very, very different climates. In general, the moon has a harsher climate. It has a day and night difference that is large and it is very cold compared to the earth, about 35 degrees colder. That 35-degree-Celsius difference is due to the atmosphere of the earth. It is due to the fact that we have a water-covered planet, but some of that water is in the atmosphere—that is the major greenhouse gas, water vapour—and there are other trace constituents, carbon dioxide being one of the more important ones, but they are present in only very tiny quantities. Carbon dioxide is now present in about 350 parts per million on an annual average and it is that suite of gases that keeps the planet as habitable as it is.

There is no lack of scientific consensus on the greenhouse effect. It has been said that it is as firmly established a theory as gravity. What we are talking about in coming decades is what is going to happen to the greenhouse effect as people have become numerous enough and their use of energy has become intensive enough for them to have begun to modify the chemical composition of the atmosphere, not just on a local scale but globally.

These curves are among the most compelling evidence. The uppermost curve is the rate of rise in carbon dioxide since 1958, when it was first measured by my colleague at Scripps, Charles David Keeling, who is still measuring it today. There is absolutely no question about these data. People query climatic impacts; people query energy scenarios; people query science of all kinds. Nobody questions these data.

During the nearly 30-odd years that Keeling has been measuring this concentration, it has gone up from 315 parts per million on global

annual average to around 350 parts per million today. So it has increased by something like 10 per cent over the last three decades. We know from having measured its concentration in gas that was trapped over a century ago that in preindustrial times, in the middle of the 19th century, before people began putting CO₂ into the atmosphere from burning wood and fossil fuels, that the concentration was around 280 parts per million. So it has gone up about 25 per cent over the time since the Industrial Revolution, and it is now increasing at about 0.5 per cent per year. There is absolutely no question about that, nor is there any question about the source of the gas, which today is primarily combustion of fossil fuels.

The other curve, the smaller, steeper curve to the right, shows the rate of rise since the late 1970s of atmospheric methane, which is the next most serious gas in the suite of greenhouse gases. It is rising about twice as fast as CO₂, about one per cent per year. It sources and sinks. Where it comes from and where it ends up are much less well known than those of atmospheric carbon, which themselves have some uncertainties. Its rate of rise is steeper in molecule for molecule. It is a more efficient greenhouse gas. However, its concentration is much lower, so it is less effective than carbon dioxide.

In general, the rule of thumb is that today the net effect of all the gases that we are discussing, all of the greenhouse gases that have human sources, methane, nitrous oxide, the chlorofluorocarbons, ozone, is about equal to that of CO₂. So CO₂ is the dominant gas, but as a rule of thumb the net effect of all the others is as strong as CO₂. So when we speak for convenience about what will happen when CO₂ has doubled, it is well to keep in mind that the effect of the CO₂ doubling will occur long in advance of the CO₂ doubling itself because of the other gases, some of which are rising much faster.

Incidentally, the CFCs, which are being phased out as a result of the Montreal protocol and other accords because of their damage to the ozone layer, are going to be replaced by gases which are benign with respect to ozone, but which still have substantial greenhouse properties. So the CFCs, which do damage in two separate ways, are still going to be with us in terms of their substitutes having greenhouse effects, and they are very long-lived. They have lifetimes of the order of a century. So once you put them in the atmosphere, they are there for a long time.

One of the themes that recurs in this story is that we are already committed to some degree of climate change because of gases that were put into the atmosphere before today. The effect of these gases is delayed, and that is why it is still very uncertain as to whether we are seeing in present-day climate data evidence that man-made changes to the greenhouse effect have occurred. We believe that we are committed to them in the future, but the effects are delayed because of the way the climate system works. I will talk about that in a moment.

The issue I am not going to spend very much time on is the question of what the future course will be in terms of these gases. As I said, some of them have unpredictable sources and sinks. Some of them are subject to major human controls. For example, in methane there is a relatively small difference between the amount that is put into the atmosphere and the amount that comes out, kind of a 10 per cent source-sink difference. The potential for modifying the atmospheric content of methane is there, just as we can agree to turn off CFCs. That is not true of all the gases. The carbon dioxide scenario in the future depends, as you know, very strongly on decisions that are taken about energy, and it depends very strongly on decisions that are taken all over the world.

It is absolutely laudable, I think, that an entity like Ontario will see fit to take a leading role in this issue and to show by example what can be done. On the other hand, it is very clear that the problems are global. Right now, the United States is the largest single producer of CO₂ and the per-capita production of atmospheric CO₂ is high in countries such as the US, Canada and some European countries.

On the other hand, even in a low-growth energy scenario, China, because of its immense population, passes the US as a net contributor of atmospheric carbon in something like a decade from now. The climatic consequences are global. The carbon that is put into the atmosphere gets mixed very efficiently so you cannot alter the climate of your region by changing what you put into the atmosphere. For radiative purposes, carbon dioxide is a well-mixed gas and its concentrations do not vary very much from one place to another as soon as you are outside local sources.

This is the record of what the production of carbon dioxide has been. You can see the immense explosion in use following the Second World War. You can see also the effects of the Depression in the 1930s. The future is uncertain,

but best estimates are that the uncertainty is represented in a schematic way by this widening blue band as time goes out. A gigaton, by the way, is one billion tons.

The expectations are that by some time in mid-21st century, maybe 2030, maybe 2040, carbon dioxide will have reached twice its preindustrial concentration. So that number, which may have been 280 and is now 350, will be 560 or something like that. As I said, the effects of the CO₂ are added to with those of the other greenhouse gases, so the effect of CO₂ will have doubled before that time.

On the other hand, the climatic consequences are delayed. They are delayed mainly because of the ocean. When we talk about how carbon dioxide will affect climate, we are talking about a climate system now that involves much more than the atmosphere. It involves the ocean; it involves the cryosphere, the world of frozen water, of ice; it involves the land surfaces in the biosphere of the world of living things.

I want to say a little bit now about our ability to model and predict those changes.

First of all, let it be said once and for all that we do not yet have unambiguous evidence, in the temperature record or any other climate data or in the combination of all the climate data that we have, that there has been an anthropogenic, human-caused, change in the climate. There are people who think there is, but there is not yet agreement on that subject and the scientific consensus lies on the sceptical side of scientists saying on the one hand they are quite confident that the greenhouse effect is real, that one ought to be concerned, but on the other hand that you cannot look simplistically in the existing temperature record—and this is a kind of sketch of the global average temperature record—over the last 100 years and see evidence for the greenhouse effect.

The weasel words that are used are that the evidence is not inconsistent with the greenhouse warming scenario, but you cannot yet find the smoking gun in the same sense that the ozone hole in Antarctica was a smoking gun for CFCs. You do not yet see in climate change, even in the fact that we have had warm years in the late 1980s, unequivocal evidence that points to greenhouse gases as agents that have already changed our climate in an appreciable way. It is likely that that evidence will occur within the next few decades, and maybe as soon as within the next decade.

This kind of chart submerges a lot of facts in a simple curve. One that you can see from this curve is that the temperature rise that has occurred over the last 100 years is uneven in time. There are times when temperature rose rapidly and times when it fell. This chart does not show that it was also uneven in space, and in many ways the temperature changes that we can document, over the recent decades where we have good enough data, are not much like the ones that the climate models predict.

For example, within recent years there has been some warming in high northern latitudes, but it has not been the sort of warming that the models tell us CO₂ ought to produce. Instead, for example, in recent years Alaska has been anomalously warm, but that seems to be associated with a change in the circulation. The Icelandic low, a region of low pressure off western Canada, has strengthened and brought more warm air up from lower latitudes. We do not see the kinds of change that the models predict.

So, in the temperature record, either one, simplified to a single variable like global average temperature and plotted versus time, as on this chart, does not prove that the greenhouse effect is getting stronger. Additionally, a chart like this has to be interpreted keeping in mind that the further back we go, the worse the data is, that measuring data over land is complicated because thermometers stay in the airport, that the city envelopes the airport, for example.

Measuring temperature in the ocean is complicated, first, because ships do not go everywhere; second, because where they do go they make measurements of varying quality. As ships got deeper, the thermometers were placed lower on the hull, and so on. There are a lot of problems in responsibly interpreting records like this. Half a degree of change over 100 years is a smallish number.

I believe, frankly, that it is a mistake to place too much emphasis on trying to find in a given set of climate data unambiguous evidence for a climate change. Somebody is going to be able to look back and say, "I was the first to say that we saw evidence for the greenhouse effect." But it is a little bit like the roomful of monkeys that will type Shakespeare if they type long enough. It only takes two monkeys to say, "Yes, we have seen a change," or, "No, we have not."

I think that the question of whether or not you unambiguously detect it, although it is extremely interesting to the man in the street, is not the most important scientific issue. The real question is, how are you going to cope with it when it occurs?

It is very hard to find a scientist who will say that we are not headed for climate change. It is certainly true you can have a record-breaking December thrown in with a long-term trend.

The models tend to converge, and have for some years now, around a figure of about 3 degrees Celsius, about 5 degrees Fahrenheit, as a global average warming. That is simply an indication of the overall sensitivity of the climate, of the models, in this case, to doubling CO₂. This is a game modellers play. It does not tell you what the climate will be in Ontario or in the world at large next year. It says that if you do a thought experiment—the kind of thing theoretical people like and politicians have not much use for—of doubling carbon dioxide in the atmosphere, going away and waiting until the atmosphere has come into equilibrium with its new chemical composition and then comparing the temperature with the old one, how big will that difference be? The answer tends to be around 3 or 5 degrees.

The real effects of climate change will not be simply from a warming; they will be from changes in precipitation patterns, changes in sea level, changes in the intensity of tropical storms, changes in many aspects of the hydrologic cycle and the ability of plants, everything from wild forests to crops, to cope with those changes. So global warming is in a way an unfortunate name for the phenomenon we are talking about. We are talking about a climate change that will affect many parameters of climate, and the warming is simply one of them. As has been said, a little bit of warming on its own might not be a bad thing in certain parts of the world. It is the changes other than the warming that we are concerned about.

The kind of depiction that the climate models produce looks like this. First, you can see from the ragged edges of the continents an indication that this is a kind of modelling that does not have fine-scale resolution. You cannot look down here and see what an individual region is going to do. This is a broad-brush picture. The grid points in the model are hundreds of kilometres apart. The ability to distinguish between the microclimates of, say, one side of Lake Ontario and the other—which is a big thing to people who live there; they know that well—is not present in this model, which can give you at most a kind of broad-scale feature.

In this one, the darker the red, the stronger the warming, and you can see the strong warming at high northern latitudes. That occurs for several reasons, the most important one of which is that as the climate warms in this model, some of the

snow and sea ice melts and the snow-line, if you like, recedes towards the pole as time goes on. The darker earth or darker ocean that was under the snow or ice absorbs more sunlight; the reflectivity of the earth has been decreased by the melting of that ice and snow, and that enhances the warming.

That is a good example of a positive feedback; it keeps the climate change highest in high northern latitudes. That does not occur in Antarctica, because when you melt some snow in Antarctica, you expose simply more snow that was under it. So you have not changed the reflectivity very much.

I would like to say another thing about Antarctica while we are on the subject of glaciers. One of the most serious consequences of climate change is likely to be sea-level change. Sea level is thought to be rising slowly, very slowly. About 24 inches per century is the best current estimate, which by the way comes from a scientist at the University of Toronto, and the change is due to several factors. As the climate warms, the ocean expands, simply thermally; warmer water takes up more volume than colder water.

Some of the continental glaciers and Antarctica and Greenland in particular, where most of the frozen water is stored, melt, and that contributes to rising sea level also. The effect that we see today is complicated by other factors. The sea level may be rising, but in some areas the continents are sinking; they are still changing their position relative to what they were during the last ice age. They have a very long time constant, if you like.

The notion that sea level will rise during a climate warming is appealing intuitively. We know that during the ice ages sea level was much lower. Yet it seems likely that during the initial stages of a warming, sea level may not rise due to the warming because the hydrologic cycle speeds up. In a warmer climate more water is evaporated, more rain and snow fall; the whole process of transfer of water from the ocean to the atmosphere and back is faster.

It is about 10 or 15 per cent faster in a doubled CO₂ world. So a given glacier may accumulate more water from extra snowfall than it loses from melting, and that means that sea level may not rise due to that cause, an example of a complicated bit of climate theory that is not yet well understood and an example of a prediction that ought to be taken with some scepticism, with some grains of salt.

The temperature map here is one that many models are in agreement with the broad features of, but if we try to look at what happens to the hydrologic cycle, to the precipitation, there are more differences. This one shows that over North America and the Soviet Union, there is a substantially drier climate that comes about for a variety of reasons. One is that the winter snowfall melts earlier and another that the spring precipitation in both North America and northern Europe and Asia comes earlier and is over sooner, so there is less water left in the ground and in summertime there is a strong reduction in precipitation because the local source of moisture from the soil is depleted.

These are predictions that are on the edge, and probably over the edge, of what modern climate theory is prepared to produce. In many of these cases, one is asking more of the science than it is prepared to give you. This is the kind of map where you might wish the model would be able to shrug its shoulders and say, "I don't quite know what the answer to that question is." But models do not do that, they produce answers, and the trick is to interpret them responsibly and know when to trust the model.

This is an example of a prediction that I would say one ought to take seriously, but not literally because it depends on the model's equations having been primed with an accurate representation of how precipitation occurs, how the ground stores water and a whole host of detailed processes in the hydrologic cycle that we do not really understand well and that we are not good at predicting. So it is an example of something that might happen, but it is not in any sense a firm prediction.

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Most of the uncertainties in climate models come from this kind of uncertainty about the basic physics, and the two areas by consensus that are the sources of the greatest uncertainty are clouds and the effects of the ocean. I want to say a few words about both of those processes next.

Clouds are crucial. Clouds cover half the planet and they are responsible for most of the sunlight that the planet reflects. About 30 per cent of the light from the sun that hits the earth is reflected away by clouds and by the surface, mainly ice and snow. That 30 per cent never participates in the climate at all. It is as though the earth were covered with a kind of dirty mirror, and that mirror reflects away some of that sunlight before it ever gets here.

Most of that reflecting, as I have just said, is done by clouds. About 20 of the 30 per cent goes

away from clouds, so that if there were a relatively small change in the clouds that accompanied a climate change, it could make a big difference. The clouds could make a difference easily as big as the CO_2 , and we do not know what the sign of that difference would be; that is to say, we do not know whether clouds will stay the same or whether they will alter the cloud amount, the cloud height, the cloud type, distribution with geography. We do not know whether the clouds would add to the climate warming or would reduce it. In recent model results, until quite recently, the clouds have tended to amplify the climate warming.

I have brought along—maybe I will show this now. This alphabet soup is a depiction of the results of 17—count them—different models, each of which was run with the same experiment. The climate model, which after all is a computer program, had its carbon dioxide doubled and then the result was interpreted in terms of this sensitivity figure as to what the global average warming would be. The alphabet soups are the lists of the places where this goes on.

The bars going from left to right show the earlier ones on the left and the later results on the right of each model. The clear bars are distinguished from the shaded bars by a change in the model. With the shaded bars the model was changed so that its clouds could vary as the climate changed. Usually the modellers make the clouds proportional to relative humidity; moister air is cloudier. The clear bars have their clouds fixed and, in general, you can see that the shaded bars are higher than the clear bars. That means that the clouds had a positive feedback.

As the clouds were allowed to vary with the climate change they fed back, they altered their reflectivity or their amount or their greenhouse effect, because clouds trap heat too, in such a way as to amplify the warming. This bar on the far right, the little one, attracted the attention of Mr Sununu in the White House, because it was a change in the cloudiness that seemed to decrease the model's sensitivity to climate.

The models differ from one another by a factor of about three today in their sensitivity. You can see that the short bars here are about one third the height of the tall bars. Most of that disagreement between the models is due to clouds. In no case do the models show a cooling. They all show a warming, but it is 1 degree in some cases and as high as 5 degrees or so in other cases. But, in general, the range is around a factor of three.

This does not mean not to trust the models. It is simply an indication of the fact that within the

understanding of present-day climate theory, within our knowledge of how the climate system works, this single process, the ability of clouds to alter the climate, is uncertain and it means that more research needs to be done. It will likely affect not just the global sensitivity but the local sensitivity because, although carbon dioxide is well-mixed in the atmosphere, clouds are not. The clouds in southern Canada can be very different in character from the clouds in, say, the southwestern United States. So these changes may be different from one region to another. It is an example of the kind of uncertainty that one can hope will be reduced as time goes on with more research.

The ocean has an immense heat capacity. That is why we use water in the radiators of cars. The ocean is resistant to temperature change. It is the flywheel of the climate system. It is a buffer that keeps the climate from changing too fast. It plays major roles in several ways in the carbon dioxide greenhouse problem.

In the first place, it is the source of water. When the ocean warms up, water is evaporated into the atmosphere more effectively than from a cold ocean, and the water vapour is itself a greenhouse gas, as I mentioned earlier. In a way, the carbon dioxide can be thought of as a trigger for humidifying the atmosphere. CO₂ traps some heat and warms the ocean. After the ocean warms, it evaporates water and the water traps more heat, the positive feedback that all the models agree on.

How long that takes depends on how much of the ocean is involved, whether the ocean circulation changes, whether the warming is confined to a thin layer near the surface. The more of the ocean that is involved, the longer it takes, because it takes a longer time to heat a deeper mass of ocean. The best estimate today is that the ocean delays the warming by several decades, perhaps 50 years, as a kind of ballpark figure.

That is why we do not see the result today of putting carbon dioxide into the atmosphere in the recent past. It is because there is a time lag that has to go on, and that is why we think we are already committed to a greater global warming than we have seen, because the CO₂ has already gone in there. So we are seeing the effects of CO₂, if you like, that has been put in several decades ago.

But this transient aspect, how fast the climate warms, is one that depends crucially on the role of the ocean, and the ocean is, like clouds, not fully understood or well modelled. Climate

modelling grew out of the effort to predict weather, purely an atmospheric problem, and long-range climate, unlike short-range weather, involves much more than the atmosphere. Principally it involves the ocean.

I have listed on this chart several other features to keep in mind. In trying to find out what the climate will be in the future, as well as in interpreting the climate data from the recent past, a lot of factors come into play besides CO₂. In fact, one way to identify people whose opinions you ought not to trust too much is to see whether they are fixated on one cause, like carbon dioxide, as responsible for all the climate variation, because many things happen in climate besides CO₂.

As I have mentioned, there are other greenhouse gases, and there are effects of clouds and effects of changes in the reflectivity of the land. Solar intensity and volcanoes are the other factors on there. We know that over a large fraction of the earth for a period of time, around a year or more, there have been noticeable coolings after major volcanic eruptions. Volcanoes put particles into the atmosphere which impede sunlight and cause a local cooling.

We know also that the sun can fluctuate in intensity by amounts of the order of one tenth of one per cent in terms of the few years that we have been measuring it. We have only been measuring that for about 10 years. But during that time, the sun has fluctuated by that much, and if it fluctuated by substantially more, it could also cause changes in climate, and the climate itself may have its own natural variability.

It is well to keep in mind that some of the most significant climate fluctuations that we have experienced within recent living memory—the dust bowl in North America during the 1930s, for example—were, so far as we know, not caused by the greenhouse effect or anything else that people did. They were natural variability; they were an example of what Mother Nature can dish out when she is in a bad mood. That natural variability of the climate system is going to be there whether or not we make changes in the amount of carbon dioxide in the atmosphere.

If you want to try to remember one single picture of the ones I am showing, I recommend this one. It is a kind of indication—that is the wiggly line—that we will still see year-to-year variations, as we always have. There will be cool winters and warm ones; there will be wet summers and dry ones. They will vary. El ninos will come and go. There will be the same amount of interannual variability and maybe more. But

superimposed on that there is likely to be a gradual warming trend, and as time goes on, that warming trend will become more and more apparent to the man in the street. My colleague Keeling says you can measure it by the percentage of members of the United States Congress who will be convinced of the reality of the greenhouse effect.

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When that signal emerges from the noise depends on, as I said, the difficult job of trying to detect a very slow trend in a record that involves a lot of year-to-year variations and a lot of place-to-place variations. We tend to have visions that are concentrated on where we live, and we can have a cold December in Canada and a very warm one somewhere else. But, on average, we will expect to see a warming, and many people think that around the turn of the century, it is likely to be more unambiguously detectable than today.

The question of trees came up. I am not going to talk very much about policy options, but I do know roughly how many trees we need to plant—at least I know what somebody else has calculated—and the answer comes out to about 1,000 trees per person on global average to cope with the CO₂ that we are putting into the atmosphere. That is five trillion trees on the planet.

It should be about 5,000 trees per person for the people who are using the most energy per capita, like those in Canada, the United States and East Germany, but 1,000 trees on average, which is reforesting an area the size of Australia. About 20 per cent of the forests have been cut down since people first started cutting them, and it essentially involves reforesting them. Furthermore, as was explained this morning, you have to make sure that the tree sequesters the carbon, so that you do not let it rot when it dies, or you plant a new one to replace it or lock it up in a zinc-lined coffin in your garage or something like that.

The bumps on Keeling's curve—the curve that I showed earlier of carbon dioxide rising from 315 parts per million in 1958 to 350 today—there are annual wiggles on that curve. The curve, as it goes up, fluctuates every year. That is the biosphere breathing. That is the cycle in trees. The trees take in carbon dioxide during the spring season when photosynthesis is stronger; they respire all year long, so that in the fall as the trees become senescent, the leaves fall, for example, then some of that carbon goes back into the atmosphere.

Trees are more effective than other plants. They are more effective than domestic crops by far, for example, or grasslands in sequestering carbon. It is certainly true that there are many good reasons for not chopping down trees and for reforesting them.

I have mentioned clouds and I want to say once and for all that one of the things that needs to be done is to keep on doing research in this problem, to luxuriate in the fact that we are dealing with a problem with a decadal time scale. So far as we know, there is no immediate doomsday in store. We are not talking about a wall of water coming ashore, the sea level rising. We are talking about something that is very gradual, that occurs over a time scale of decades, long enough for us to monitor and be vigilant and do research and understand better, while we are acting, while are taking the prudent actions that will reduce emissions wherever possible.

The research needs to be concentrated in many areas, one of which, I have mentioned, is clouds: fundamental research on how clouds work, satellite remote sensing of clouds and so on. There is a lot to contribute to this problem. Research costs money, supercomputers cost money, but the research is cheap compared to all the mitigating actions that are being talked about. It is very cheap compared to altering the way a society uses energy, at least in the short run. In the long run, as you know, many energy changes save money. It is absolutely essential.

I believe that it is sometimes not realized what a slender scientific base is being used on which to hang momentous policy decisions. I have said that these models should be taken seriously but not literally. They are not created by large teams of well-funded scientists with dedicated supercomputers. They are from small groups of a handful of scientists often working with less than state-of-the-art resources in many ways. That is the end of the plug for research.

This is an example of one reason why I am optimistic about the future of being able to make scientific progress on this subject. This picture, although it is with data from more than a decade ago, illustrates the capacity we have today that we did not have until very recently for globally monitoring the planet. There are major international efforts under way, in which Canada is a very strong participant, to do a better job than has ever been done in monitoring the climate, from satellite remote sensing especially but from many other tools as well.

This is a picture of the temperature over the whole earth from a single instrument—actually a

suite of instruments—on satellites flying synchronously, and we are now able to measure not just temperature but water vapour, many properties of clouds, the distribution of sea ice and many other conditions from space that not only will make us more aware of global changes as they occur but will improve our ability to incorporate the climate processes that I mentioned as causing uncertainties in our model.

I think there is an education effort that needs to be made. I have put up a volcano as an illustration of something random that can have a climatic impact. We know there were major climatic impacts from the massive eruptions of the historic past. We do not yet know how much of that impact is present in the record that I showed you of the temperature changes over the last 100 years.

It seems to me that an important function is not only to raise the level of science education in the public at large. We already know that the public is very much concerned about global environmental issues and willing to spend money to see that they are put right, but we know also that there is an appalling level of invincible ignorance. It is there in the media; it is there in our school systems. It is not just for training scientists but for a public better able to cope with the changes of the future that we need to make major efforts in education. That is something that every jurisdiction, it seems to me, has a stake in doing.

When you compare the present climate with the past, it is well to keep in mind that part of climate may be unpredictable and that although we have every reason to think the greenhouse gases we are putting into the atmosphere are going to cause serious climatic changes, we will not be able to ascribe it, given climatic events, to the greenhouse effect or necessarily to any other specific cause. We may be talking about changes in probabilities, a different loading of the dice. Droughts may become more frequent in some areas but they will not overnight switch from wetlands to deserts. In the same way, we may have a different frequency of mild winters or of sweltering summer days in some regions than in others.

It is the difficulty of coping with that uncertainty, I think, that has a major effect. The political horizons are often shorter than those of the climate system. It is often hard to get people excited about something whose consequences may be years away. Yet the actions we are going to take in the near future will have long-term consequences, just as whether you smoke today

may have long-term consequences to your health. If we can persuade people to give up cigarettes, then maybe we can persuade them to give up fuel-inefficient cars and many other bad habits we have got into.

I want to say a few things in closing and then I will be glad to take questions. There is no doubt that at this stage, uniquely in human history, we have moved up out of the audience and on to the stage of the play, that we are participants in the climate system rather than just passive observers of it. It is no accident that the greenhouse effect comes to the fore at the same time as do acid precipitation and changes to the ozone hole. They are all due to the population having got large and energy intensive.

The problem is international and so are the solutions. Nothing that one region can do will, by itself, change the picture but every area has to do something. The time scale is so long that many other things will change besides climate. I think it is often helpful to think, and it helps you to stay optimistic, that 50 years ago much of what we take for granted today in everyday life was not foreseen, except by a few visionaries, jet travel, colour TV, nuclear weapons and antibiotics among them. So in 50 years, when CO₂ will surely have doubled—and is likely to triple thereafter—many other things will have changed too, and a technologically competent society can cope with many changes if it wants to.

The greenhouse problem, it seems to me, can stir a certain amount of international co-operation and creativity. In bluntest terms, there is money to be made on the greenhouse effect. Somebody mentioned this morning the possibility of manufacturing things locally which will be in demand to promote energy efficiency. I think there is a great deal to be said for that and there is a great deal that the developed world can do to help the undeveloped world, on which the fate of the climate may ultimately depend.

I will stop with that and take questions.

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Mr Callahan: I have a couple of questions. First of all, why is CO₂ such a heat absorber? Is it something to do with its molecular structure?

Dr Somerville: That is right. The carbon dioxide molecule, an atom of carbon and two atoms of oxygen, just happens to be able to absorb energy in the infrared, in the region where the earth emits. The sun is hotter than the earth, so its energy emission is peaked and divisible, a much shorter wavelength. Cooler bodies emit at longer wavelengths and carbon dioxide is one of several gases that have the ability to absorb and

then to reradiate energy in that wavelength. Water vapour is another, and other gases we have mentioned.

Physically, what is happening is that the molecule is absorbing energy and vibrating faster and then re-emitting that energy both upwards and downwards. The downward energy that it re-emits is what heats the surface.

Mr Callahan: If that is the case, has there been any research into converting what would ordinarily go out as carbon dioxide, breaking it down into the different elements?

Dr Somerville: Yes. That is expensive. It is not something that is amenable to a technological fix. You cannot do the equivalent of putting a scrubber on a stack the way you do to help the acid precipitation problem. The CO₂ is, you might say, an inevitable byproduct of combustion, just as water vapour is. It is going to be ubiquitous, so the way to reduce the emissions is to generate less energy by processes that create CO₂ rather than to try to cope with it once it is in the atmosphere. Once it is in the atmosphere, it takes something clever like a tree to get it out.

Mr Callahan: Is there any research to show what amount of the increased CO₂ that is in the atmosphere is a direct result of the population expansion, because we all emit CO₂ as well?

Dr Somerville: That is right. All the sources now are small compared to fossil fuels, with the single exception of forest clearing. That was not always the case. Obviously, before we were burning coal and gas and so on there were other sources that were important.

Much of what is put into the atmosphere does not stay there. Roughly half ends up in the ocean, where there is a much larger reservoir. The ocean absorbs CO₂, it gets taken up by the biosphere, by living creatures in the ocean and ends up, much of it, on the floor of the ocean as the shells of these creatures which form ocean sediments.

That gigantic global geochemical cycle is one in which we are powerless to intervene. Essentially, from the human perspective, it is a question of fossil fuel emissions supplemented by deforestation, and half of that CO₂ balances the books and stays in the atmosphere. The rest ends up in the biosphere, and mainly in the oceans.

Mr Callahan: You are including in that population and human activity things such as nuclear tests, which I imagine would have a significant impact on the CO₂ emissions.

Dr Somerville: No, they do not, because fortunately there are few of them, whereas there

are people out burning coal, oil and gas every day.

Mr Callahan: Since we have known about photosynthesis for some time, is there any research into developing that process in some man-made way to allow CO₂ operations to take place but to be in fact photosynthesized before they are released into the atmosphere?

Dr Somerville: Right now, it is only plants that are bright enough to use energy from the sun to power this process. If we try to take carbon dioxide out of the atmosphere, we have to expend energy to do it, energy that we have to generate by some process such as burning coal, so it is a no-win situation for people. You cannot do much about the CO₂ once it is in the atmosphere, as I said, with exceptions such as reforestation.

As you know, carbon dioxide is itself a fertilizer and in the case of some plants, their growth is CO₂ limited. Too much is ordinarily made of that, but it is certainly true that some crops will benefit by increased CO₂ concentrations. In many cases, that is not something to pin your hopes on; that same crop may lose more by changes in the hydrologic cycle. It has not been stressed enough that one of the problems with the climate changes that we are anticipating is that although they come on a slow time scale by human standards—we are talking about things that may affect our children more than ourselves—they come on a very fast time scale by natural standards. So it is very unlikely that there will be regional winners, as is sometimes said, in the climate change, because the speed of adaptation is too large.

Forests die out, for example. They might migrate northward if the climate were warming, but they cannot do it quickly enough. The seeds, so to speak, do not fall far enough from the tree. That is sometimes literally the case. We are talking here about a climate change which is comparable in magnitude between the present climate and that of the last ice age, but in the opposite direction, a warming rather than a cooling. We are already in an anomalously warm period by geological standards. It is an interglacial period; the ice is near its minimum extent, and we are talking about adding to that a change that can be very large.

That is one reason why the three or four or two or five degrees of global warming may not carry the right message. People may say: "I can cope with three or four degrees. It was three or four degrees warmer last week and I did just fine." That is right. If there were nothing more than that, you could. People can cope. I live in San

Diego. It is colder now in Toronto that it has ever been in San Diego and I have coped, but that is very different from asking agriculture, for example, or forests or wild animals to cope.

Mr Callahan: Finally, if you carry that way into the future—I know this would be asking for a projection far beyond your lifetime or children's and grandchildren's—if you carry that to its nth degree, do you eventually get back to an ice age?

Dr Somerville: Ice ages come and go on time scales of about 100,000 years and they are thought to be paced by changes in the earth's orbit. The earth's orbit, the ellipse that the earth makes around the sun, changes slightly its configuration, its orientation, over periods of time of tens to hundreds of thousands of years, and that influences the amount of sunlight that comes on the earth at different seasons and is thought to be associated with the ice ages. There are still lots of unsolved parts of that puzzle, but that seems to be the case.

When we talk about ice ages, about a subject that is different on its time scale from CO₂, you cannot ask for an ice age which may come, but maybe in 1,000 years or 100,000 years, to solve the decadal-scale problem that carbon dioxide is likely to cause. Again, we are using carbon dioxide as a code word, because we are technologically sophisticated now, for a whole suite of other gases, so even if we solve any one of those gases, we will still have others to cope with.

It is just not smart to make major changes in the global concentration of an important trace gas without understanding the consequences. I think in many ways that is the bottom-line advice. We are talking about doubling the concentration of a gas that is going to cause changes which we have every reason to think will be serious and every reason to think will be largely deleterious, which we do not fully understand, which may be irreversible in nature. That being the case, it is not smart to do that if it is feasible to avoid it.

Mrs Grier: Your last sentence almost answered my question which was, I was concerned when I heard you talk about uncertainty and the need for more research and there was no immediate doomsday and no smoking gun, all the kinds of phrases that would lead many politicians to say: "There is no need to do anything. We have lots of time. We need to study longer." But I take it that is not what you are saying.

Dr Somerville: That is correct. I am trying to strike a very balanced position, which as I said at the beginning, is not simply my personal view

but is a view that I firmly believe reflects a strong scientific consensus. In fact, it is amazing how few opinions there are out on the tails of the spectrum and how strongly nearly unanimous and knowledgeable the scientific community is on this issue that it is a serious issue, that it is worth doing things about—I would not be here if I did not believe that—and that there are responsible things that can be done—they vary very much from country to country and place to place—while at the same time one does research to understand the problem better. We have the luxury of a decadal time scale to this problem so that we have time, if you like, to buy time. We have time to work out the ultimate solutions by trying some of the things that are doable in the near term.

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An ultimate solution, for example, would be safe energy generation. I would love for cold fusion to work. If we wait long enough, maybe hot fusion will work. Maybe we will get better at renewable energy resources than we are now. Maybe other countries will decide to go the way of France and make most of their electricity from nuclear power. We know that has serious drawbacks right now. I believe the fact that this problem is serious can generate thoughtful research towards problems like the nuclear waste disposal problem. I think it can make you look again at alternative sources of energy and it can certainly spur you to do energy efficiency and energy conservation. I am very much in favour of that.

I am trying to ask the political establishment, if you like, to be sophisticated enough about this problem to understand that one can at the same time do research and take counteractions, not only actions to reduce emissions but actions to educate the public and to plan to cope with the climate change to which we are already committed. So there is a whole suite of things that need to be done on a variety of time scales.

I very much oppose the simplistic viewpoint that says: "Either the scientists have solved the problem and therefore we will know what to do, or the scientists still disagree and there are uncertainties. Therefore we should not do anything." I think there can be uncertainties and there can still be strong motive and opportunities for taking action.

Mrs Grier: One of the things you said, and I think I have it right, was that there is a school of thought that would argue that human activity has not necessarily caused the temperature rise. Am I quoting you correctly?

Dr Somerville: Yes.

Mrs Grier: If that is the case, is it logical to argue that human activities can do something to counter the temperature rise?

Dr Somerville: Humans can do things to counter the temperature rise that will occur to the best of our knowledge if our present energy policies continue unabated. If we continue burning fossil fuels, we are likely to exacerbate the rise that we have seen, which is not inconsistent with greenhouse projections.

After all, look back at the picture that I showed of temperature change. The rise in the early part of that could not have been due to carbon dioxide. We were not putting enough of it in the atmosphere then. The strong rise that you see around the turn of the century was followed by a strong fall. One has to be sophisticated enough to recognize that climate can vary on its own, without being prodded by any of these changes, and that there are factors like volcanism and solar changes that may also be contributing. Part of this rise may be due to carbon dioxide, part is certainly due to other causes, but we are projecting a steeper rise in the next few decades. That is cause for concern.

At the same time, we have to recognize that there is a multiplicity of causes. It is very hard to unscramble the omelette and very hard to tell which ingredients caused which causes. So I do not think that the will to take action ought to be reduced by the uncertainties in either the climate models or the difficulties in interpreting this data.

Mrs Grier: Take me once again through the logic that says it is best to concentrate on the carbon dioxide. I know it is the largest amount, but from some of the other things that you said, it seemed to me that if we could come to grips with the methane or one of the others—how do we decide where the best contribution can be made?

Dr Somerville: CO₂ is the largest single gas and it is the one to which you might say we are the most deeply wedded, because CO₂ is the inevitable byproduct of the way we generate the bulk of the energy we use on this planet. So it requires the biggest effort.

We are lucky with chlorofluorocarbons because we know where they come from and it turns out to be technically feasible to make substitutes for them. The substitutes, as I have said, are benign with respect to ozone but still have greenhouse properties.

Methane is very complicated. It comes from lots of crazy sources. It comes from cows, it comes from leaking gas lines and it goes in different places; it comes from rice paddies.

There is more work to be done to know how to control methane, whereas we know where the CO₂ is coming from. So those are the reasons for concentrating on CO₂, but it is the largest single culprit and it has a very long lifetime. Methane does not, but CO₂ stays in the atmosphere for 1,000 years.

The Chair: We have the concurrence of our next witness to let this conversation and discussion proceed a little bit longer than had been scheduled. I will still ask members to keep their questions as concise as possible because we do have a list. We will continue this session for another 15 minutes.

Mr Pollock: On one of your charts, all over the world the only place that was drier was in the American Midwest and the Canadian midwest. Maybe it is going on in other parts of the world, but we know that in that particular area they are doing quite a lot of irrigation. Do you think that has a bearing on that particular area?

Dr Somerville: Irrigation is not taken into account in these models. No, the drying you are seeing in central North America, inland North America, in the grain belt if you like, as well as in the Asian part of the Soviet Union is due to the model's interpretation of natural causes. It is due to changes in storm tracks and to changes in ground water, as I mentioned earlier. As I mentioned also, I think it is one of the more uncertain aspects of the forecasts, one where we really want to see more evidence for the model's ability to make long-term predictions of precipitation changes.

Mr Pollock: Maybe I did not phrase my question right. The fact that they are irrigating there means they are drying up a lot of duck ponds, taking water out of streams, you name it. I did not mean that you should have been measuring the irrigation too. I meant that because they were irrigating, it is leaving that whole area drier.

Dr Somerville: That is certainly true. In that whole area the ground water is being drawn down, rivers are below earlier levels and so on. So that problem may certainly be exacerbated.

I would like to mention that one possibility in the greenhouse world, the climate of several decades hence, is that the strongest tropical storms may become more intense. I am not sure whether that will have a major effect on Ontario. There are storms, major hurricanes, that have come ashore in North America in recent years—Gilbert, Hugo—and there are tropical-like storms that have hit western Europe recently and these

may become more frequent. They are an aspect of the greenhouse world that is not covered by this kind of model, that we do not fully understand yet and that may be important. Japan, for example, gets a very large fraction of its water supply from hurricanes or typhoons.

Mr Pollock: Talking about trees again, I am not questioning your calculations but I have some concerns about some of your statements about trees, because we all know trees are a crop. Why one crop is just better than another: I fail to follow that reasoning. We know that some trees will grow and die within maybe 30 or 40 years; other trees will live for 300 years.

Dr Somerville: That is right. In view of the time, maybe I should not try to go into more detail on that. All those things you said are true. It is the fastest-growing trees earlier in their growth that are most effective in sequestering carbon, and that is the major reason for it.

The Chair: We may want to continue our informal session later on, our discussion with Dr Somerville relating to the impact on our virgin forests and this whole contribution to the greenhouse. It might make for a lively discussion.

1510

Mr McGuigan: I would just like to point out to members that this model is right about the American Midwest drying up. That is the storehouse or reserve supply for the world, not just for North America. The world relies on that area and reserve supply and the implications are really terrible.

I am not carrying any torch for another scientist. I just came across this Soviet climatologist, Mikhail Budyko, and he claims that there are going to be positive effects from the greenhouse, that we will have rains in the Sahara Desert, that there will be a bit of a delay but then it will rain in the Sahara Desert and it will rain in some of the other dry parts of the world, that we should not even think about stopping the greenhouse, that we should encourage it. He goes back to palaeoclimatologists and so on.

I just wondered if you have any comments as to whether or not this is scientific stuff or it is pseudo-science.

Dr Somerville: Budyko is a well-known scientist with good credentials. Most scientists do not agree with his interpretation of the palaeoclimate as a guide to the future climate. I would very much agree with your first comment, which is that the drying up of the grainbelt in North America will have global consequences.

Once again I would like to say one more time that we will not be talking about some instantaneous change from one climatic regime to another but we may be talking about a change in probability, so that the dry years that we are used to may come more frequently. The droughts may be somewhat more severe when they occur.

That is by way of saying that we ought to guard against the possibility that if we have a particularly luxurious, wet, verdant year and bumper crops, some people will say, "You see, the greenhouse is coming and the climate hasn't caved in on us." We have to really keep in perspective the fact that we are talking about averages. The climate is the sum of all weather. It is the average, it is the extremes and it is the change in the likelihood of different climatic events. So a drying out of an area may simply show up as more frequent or more severe or more probable droughts rather than a single big flip from one climate to one that is dramatically different. It will be a slow change in the odds.

Mr McGuigan: We could look back to biblical days and storing up wheat for seven years. It is kind of interesting. Grain storage in the world today is fairly low, and yet markets do not reflect that.

Dr Somerville: Yes.

Mr McGuigan: People all around the world are relying on an annual production. One would actually expect markets to be much higher than they are at the moment.

Dr Somerville: I understand, although it is not my specialty by any means, that there is always the problem of redistribution of the crops between where they are grown and where they are needed. It is certainly true that high-technology advanced agriculture, such as is practised in North America, may be much better able to cope than agriculture in marginal regions today where the infrastructure in poor countries is simply not there to allow any sort of reaction to a climate change and where subsistence agriculture is right on the ragged edge today.

Mr Charlton: I would like to go back to the line of questioning that Mrs Grier was pursuing. You have essentially said that although you think there is more study necessary, there are a number of things that we could proceed with while we are trying to identify more precisely the problem, its extent, its timing and so on.

What would you list as the most useful, the top priority, things that we should be looking at doing and convincing governments and general

publics at large are important to do while we are in this period of uncertainty?

Dr Somerville: I will be glad to speak to that, prefacing my remark with the usual scientist's caveat that I am going outside my expertise now. I am not a policy person. That is the harder job for people like yourselves. I am strongly in favour of energy conservation and energy efficiencies. I think that when you put on a carbon tax, whether it be in the form of a gasoline tax or another form, you motivate a lot of good changes. When you have more fuel-efficient cars you have not only improved your greenhouse prospects, you have helped local smog, the balance of payments, national security and many, many other things as well. So I believe that energy efficiencies, energy conservation and accelerated development of alternative energy sources are at the top of the list.

Mr Charlton: What about the other side of that coin? I do not disagree with you at all on the energy efficiency comment. Should we be looking for some kind of a balance between, for example, energy efficiencies and cutting back on fossil fuels over and against perhaps planting of trees? In other words, is it better to broaden the attack at least in this period of uncertainty until we can define more precisely what we have to accomplish, or are we better to focus on specific things?

Dr Somerville: I think that there is no reason why those approaches are mutually inconsistent. I am very much in favour of planting trees. As was pointed out earlier today, they do lots of things besides help with the greenhouse. At the same time, I think everything that can be done to raise the level of awareness—people telling their governments that they care and that they are willing to pay, to governments exercising good offices on other governments to, for example, stopping unnecessary destruction of tropical rain forests—all of those things are on my list. When we talk about what can be done at the local and regional level, it seems to me that energy efficiency and conservation are sometimes more doable than some of the more ambitious global—some would say utopian—approaches one might take.

Mr Charlton: The last question that flows out of this is—again, I know it is difficult in the context of the uncertainty that we face at this point—that it seems to me that it is not always that you hit the target, but that things happen better, more precisely, when you do have a target. Is it reasonable at this stage, because of the uncertainties you have set out for us, for us to be trying to

set a target, or do we just blunder ahead, hoping that we are doing enough while we are still defining the extent of the problem? Should we be setting a target of some sort? Should we be trying to determine socially, economically and politically what is a reasonable target and hammering that down in hard terms, or should we just proceed?

Dr Somerville: I will go even further out on a limb and say I am in favour of targets, prefacing that by saying that you are now asking me not only what the political approaches are but how one ought best to take them: which road leads best to the desired goals. So, yes, I am in favour, for example, of higher CAFE—corporate average fuel economy—standards. One of the reasons I know what that acronym stands for is that I have been advising General Motors on this issue and I am sensitive to General Motors' viewpoint, too, which is that it is not smart to make company-built fuel-efficient cars if at the same time you provide disincentives for people to buy them, for example by having cheap gas or better fuel-efficient cars available from somewhere else.

It is a very complicated picture when you start tinkering with the economy on that scale. I am sensitive to that, but if a route can be found to make fuel efficiencies palatable and to minimize the disruption that is caused by any big change in any economy, then of course I am in favour of it. It seems to me that one has to take steps in those directions.

Mr Yeager: You were describing a number of models, most of which double the CO₂ in some period of time immediately and look at how the equilibrium establishes itself. I think there are some attempts now to develop incremental models, are there not? Could you sort of describe what is happening in that area?

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Dr Somerville: That is right. That is on the fringe of what is doable. That is frontier state-of-the-art research today. It may seem like a theoretician's toy of not much practical value to take the model and do the experiment of doubling CO₂. That is not what happens in the real world.

The reason that is done is that it is easier to do than to do the harder problem of modelling the climate change as it occurs from one year to the next. You have to know the emissions scenario and that is uncertain in the future. You have to also be able to cope with the effects of the ocean on the shorter time scales, and that is harder to do. Sometimes it is easier to make a long-term prediction than a short-term one. That may seem paradoxical, but if you put a pot of water on the

stove it may be easier to predict that in 20 minutes it will be boiling than to predict what it will be doing five seconds from now, 10 seconds from now, or 15 seconds from now. We can predict the long-term consequences somehow better if we do not have to know what the details are.

The ability to predict year-to-year and decade-to-decade changes is going to come gradually. We are learning how, for example, to factor in phenomena like El Nino, which makes a big change in the climate in North America from one year to the next when it occurs. But it is mainly a question of developing realistic ocean models and realistic means of coupling the atmosphere in the ocean on those time scales. So it is a basic research problem that is being addressed. It is being addressed here in Canada, too, by the way, at the Canadian Climate Centre, among other places, and it is research that has to continue.

The Chair: Dr Somerville, we appreciate very much your being with us today. I think we found your presentation extremely useful and interesting. I know members of the committee will be eager to continue discussion after the formal part of the hearings are finished, and we will no doubt have many other questions and discussions to put before you. Thank you very much for coming here. I know it is a long trip for a short period of time with us, but we certainly appreciate your doing that.

Dr Somerville: It has been a pleasure to be here.

RODNEY FUJITA

The Chair: Our next witness is Dr Rodney Fujita from the Environmental Defence Fund in New York.

Dr Fujita received his doctorate from Boston University's marine program and spent six years teaching at Boston University and at the marine biological laboratory in Woods Hole, Massachusetts. Following that, he was appointed the principal investigator at Oregon State University's college of oceanography. He has since spent time researching coral reef ecology and nutrient pollution. Dr Fujita is presently the staff scientist for the Environmental Defence Fund in New York, where he performs research on the ecological effects of climate change, acid rain, ozone depletion and nutrient pollution.

Dr Fujita, we are very grateful that you are able to be with us. I had asked you earlier if you could describe, as you start your presentation to the committee, some of the work of the Environmental Defence Fund and then move further into your presentation.

Dr Fujita: It is a pleasure to be here. Thank you for inviting me.

I would like to start off by saying that the Environmental Defence Fund is a not-for-profit research and advocacy group. We are not affiliated with the government in any way and our agenda is to use scientific research, economic analysis and policy analysis in an interdisciplinary way to identify environmental problems and to construct positive solutions to them.

We are perhaps best known for our early work on DDT and looking at the effects of pesticides on raptors, especially the osprey on Long Island in New York, and converting that scientific evidence into a law that banned the use of DDT in the United States. We also did some work on getting lead out of gasoline. Global warming, along with acid rain, has become a primary focus of our research activities. That is what I would like to talk to you about today.

To a certain extent, my remarks will be a little bit redundant. That is due to the quality of Professor Somerville's talk, which I found to be excellent, and also it is a testament to the thoroughness of your questioning. I was very impressed with the consensus that was expressed that global warming is a problem to be reckoned with now at the policy level, and also with the kinds of questions you are asking. Hopefully, what I can do for you today is offer a somewhat different perspective on the policy tools and dwell a little bit more on making policy decisions in the face of uncertainty, which seems to be a major theme with which you are concerned.

If I can start with the first slide. I want to just recap the factors which we at EDF feel to be items of high consensus and some of these Professor Somerville already counted. But, one, we know with great certainty that the level of carbon dioxide in the atmosphere has increased since the pre-industrial era before 1800. This curve shows not only measurements from instruments in the modern era, but data from ice cores in which bubbles that were trapped in ice were analysed and the carbon dioxide content was determined, correlated with the time at which the ice was laid down. You can see that the carbon dioxide levels were fairly flat, a lot of scattering; around 280 ppm up until about 1800 or 1850 when suddenly the rate of increase went up dramatically.

Again, here is Charles Keeling's record from Honolulu and Hawaii showing the seasonal variation to which Professor Somerville alluded, the breathing of the biosphere. Again, you can see that this curve is increasing rapidly from 1958

to 1985 and the rate at which it is increasing has also increased so it is accelerating in the last few years. Coupled with that is some evidence that the airborne fraction of the carbon dioxide, that proportion of our emissions that remains in the atmosphere and can affect the climate, has increased from roughly half of the emissions remaining in the atmosphere to something like 60 per cent remaining in the atmosphere.

In addition to carbon dioxide, of course, other gases that are radiatively active and trap heat are increasing. Again, for methane concentration in ice cores, with the historical record you can see this pattern of exponential growth; relatively flat levels for a long time until the industrial era and then skyrocketing levels after that.

The chlorofluorocarbons—the CFCs—not shown here but also the halons have also been increasing at rapid rates and of course these are entirely anthropogenic. They have no natural sources. Nitrous oxide on the bottom is another gas of concern because it, like carbon dioxide and methane, traps infrared radiation and has been increasing as well.

The other thing that we know, and Professor Somerville also addressed this in addressing your question, is that these gases are radiatively active. They trap long-wave radiation through the greenhouse effect—a well-established theory.

The point I would like to make with this slide is that the sources and, to some extent, sinks of these gases are beginning to be characterized. Again, carbon dioxide, accounting for roughly half of the greenhouse effect, is the best known of these gases. We know that carbon dioxide comes from fossil fuels, most of it about one or two gigatonnes perhaps, 1 billion or 2 billion metric tonnes coming from deforestation, removing trees and burning them in some cases as in Acre and Rondonia in Brazil and another 5.5 billion metric tonnes from the burning of fossil fuels. That is fairly well characterized and it is fairly well known, with the exception of deforestation, because you can look and catalogue all the sources of carbon dioxide from fossil fuels quite easily. They would come up in an inventory.

Methane is less well known especially because there are a lot of natural sources of methane that have not been very well characterized. Wetlands produce a lot of methane and, as was alluded to this morning, anthropogenic sources such as solid waste dumps and increasing animal husbandry, especially ruminants—cows, sheep—may be becoming a very significant source in methane and may account for the increasing concentrations that we see recently.

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In the natural world, of course, before the industrial revolution, there were emissions of carbon dioxide and methane but they are balanced by sinks, trees, wetlands making peat, which represents a form of carbon storage just like wood does. One of the problems that we are facing in the modern world is that by injecting all kinds of other gases into the atmosphere we are removing part of the atmosphere's potential to cleanse itself. For example, urban air pollution tends to remove hydroxyl ions from the atmosphere which ordinarily would oxidize or destroy some of the methane that is emitted and so we are reducing the ability of the atmosphere itself to bring those concentrations down. As I mentioned before, we are also destroying large tracts of forest without reforesting them so there is a net loss of trees from the world and this again is reducing the sinks to which carbon dioxide can return and hence more of it stays in the atmosphere.

Nitrous oxide, N_2O , comes from fossil fuels and also from agricultural stock. For example, that heavy use of nitrogenous fertilizers accompanying the rise in mechanized agriculture and the high productive yields that come from that are giving rise to increased N_2O . CFCs, as you well know, are important chemicals as electronic solvents, as blowing agents for foam, and so in the mid-1970s they were widely used in the United States as propellants for aerosols; and they are still used for that purpose in other parts of the world.

I will not dwell on the temperature record because I agree with Professor Somerville's remarks that it is not very useful to try to look for unequivocal proof that climate changes here, particularly in a record such as the global average temperature record, which is fraught with difficulties. It is very difficult to interpret these data, particularly the early records, but one thing that we can say is that this 0.5 degrees Celsius change has occurred when you do account for the heating effect of cities and so forth.

The other thing that we can say is that in the past, over the last 160,000 years or so, the levels of carbon dioxide shown by the blue line in the atmosphere, correlate rather well with changes in temperature. So when carbon dioxide goes up, temperature goes up as well. At the Environmental Defense Centre we have been looking for evidence like this in the modern world and almost at the same time as—some researchers at the Bell Laboratory have put out a paper in *Nature* recently showing some evidence that carbon

dioxide in temperature will vary in the modern record as well. In our results, we found that on short-time scales when sea-surface temperature increases in the equatorial waters and the tropical waters of the world, that is accompanied three months later by an increase in carbon dioxide in the atmosphere. This may be an indication that another kind of feedback, a biological feedback to the carbon cycle is taking place.

Much of Professor Somerville's remarks were directed at the cloud feedback and also physical feedback such as albedo changes—different amounts of ice reflecting different amounts of radiation. The biological feedback is not very well characterized either but can be a very important factor in determining the sensitivity of the climate to forcing factors like carbon dioxide or like changes in solar luminosity.

None of these feedbacks—The more speculative ones are built into the general circulation models and it is another reason to not take their projections literally but use them as guides to thinking.

The Chair: Dr Fujita, could I just ask you to comment on that particular slide. I am very interested in these time lines because when we are talking about the global warming, the greenhouse effect, we have been talking about a very recent recognition of a problem. I find it fascinating that 160,000 or 150,000 years ago in this long-range time chart we are looking at what appears to have been a higher level of CO₂ and a higher average earth temperature than that which is occurring in the relatively short period at the present, at the other end.

Dr Fujita: Yes, that is right.

The Chair: From an historical or earth-development point of view, what would have created that level of CO₂?

Mr Callahan: The dinosaurs smoked.

The Chair: They still do.

Dr Fujita: As Professor Somerville remarked earlier, the question of what triggers ice ages is still not resolved. It is thought that the earth's climate and the onset of an ice age particularly responds to what is called the Milankovich forcing, an eccentricity in the earth's orbit. The earth gets a little bit closer to the sun or a little farther away from the sun on a time scale of about 100,000 years. There are other components of the Milankovich cycle that also may influence climate, but the climate system seems to respond to this 100,000 signal.

Why? We do not really know, but one idea again is that there is a biospheric feedback that

takes a small signal, a change in orbital eccentricity, for instance, a small change in solar output, and amplifies it by, for instance, melting the tundra, which is a very effective store of carbon in the soil. When the permafrost melts, all that carbon becomes available then to the atmosphere. There are not enough plants to take it up, and so it hangs around in the atmosphere and becomes radiatively active. It is a good question, but we do not know cause and effect here.

The Chair: You do not know.

Dr Fujita: It is just a correlation, but it is an indication of the connection you can make, at least, between CO₂ that we are putting in anthropogenically and what might happen to temperature. It kind of points up the idea that we are conducting a rather large experiment with our planet because the changes in carbon dioxide that we are causing anthropogenically rival the changes that we have seen over the last 100,000 years.

The Chair: I think Mr Cooke has a supplementary to my interruption.

Mr D. R. Cooke: I was just wondering where the ice ages are on that chart.

Dr Fujita: They are at the bottom of the red lines.

Mr D. R. Cooke: I see three major ones starting at about 110,000 years ago.

Dr Fujita: Right. As we said earlier, we are in an interglacial now. That is why the red line is way up here. We are in a very warm period of the earth's history. I will show you another slide a little later on that puts this in some perspective.

I just want to use this slide to make the point that computer projections are very dependent upon how we use energy and what kinds of assumptions we make about fossil fuel use and energy consumption in general. So the best they can do is put out scenarios.

The white line is a business-as-usual curve that indicates a several-degree change by 2060. The blue line at the bottom—I do not know if you can see it that well—is a scenario when energy efficiency is ratcheted up by about one per cent per year until you achieve about a 50 per cent increase in energy efficiency, coupled with a cessation of deforestation and a massive reforestation effort. This scenario is what might happen to the climate if we are able to stabilize the concentrations of CO₂ in the atmosphere.

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The red line is very interesting. On the left, you can see it indicates much larger temperature

changes than either of the other curves, and that is because this is an attempt to take into account this flywheel effect of the oceans.

In other words, as Professor Somerville told you earlier, the oceans have a massive capacity to take up heat energy, but it does not disappear; it is still in the ocean. We do not know exactly how the ocean is going to release that and we do not know when. That is one of the major uncertainties. This thermal lag is thought to lie within about 20 or 40 years. This record shows the amount of warming that we are committed to at any given time on the chart.

It is just another way of saying that the climate system cannot be expected to respond immediately to either the current emissions of greenhouse gases that we are doing now and it cannot be expected to respond immediately to policy actions. This has to do both with the thermal inertia or lag due to the oceans and the long lifetime of gases in the atmosphere. Carbon dioxide, for example, has a lifetime on the order of 100 years. Methane is shorter, on the order of decades. CFCs are on the order of 100 years. This has a great deal to do with policymaking. One of the reasons we need to focus on carbon dioxide is that the longer the lifetime the gas has in the atmosphere, the more imperative it is to take action early because it is going to take a long time for your policy to make any difference in atmospheric concentration.

Here is a slide that smooths out that temperature variation over the last 150,000 years or so. Data are always a lot easier when you take all the wrinkles out of them to make sense of. First, let me point out that the temperature excursion between ice ages and warm periods throughout this period of time has been about 6 degrees Celsius. You can see now very clearly that at present, on the right side, we are at a very warm stage of this interglacial cycle. You can see that the changes in temperature between interglacial and glacial are on the order of thousands of years; they takes thousands of years to occur. This enables natural systems to adapt to those climate changes.

This is why a Soviet scientist made the comments, that he thought a greenhouse world would be a better world in which to live because in the palaeoclimatic record, indeed, there were reptiles living in areas which are now far too cold to support reptilians and the planet was covered with lush plant life and so forth.

One of the keys to making policy is to recognize that the rate of change we are projecting in the dotted line, where there are no

model projections, is some 10 to 60 times the rate of any natural change in the earth's history. Again, I just cannot overemphasize the importance of the point that although mankind might be able to adapt to some of these changes; although it would be very costly, by building sea walls and retreating from the shoreline, natural systems cannot do it. Wetlands will become inundated, as is already the case in the Chesapeake Bay and other areas. Beaches will erode, as is already the case in 70 per cent of the world's beaches. Coral reefs will not be able to keep pace with a sea-level rise that is some five to 10 times faster than they have experienced throughout their evolutionary history. This is a key element to bear in mind.

I would like to use this slide to try to cast policy options and some kind of framework so that we can think about it a little more clearly. The two axes are initial planning that is required to set these policies in motion and the vertical axis is cost increasing from bottom to top. For example, forestry is something we know how to do pretty well in the temperate world and there is also a great amount of research and some success in tropical forestry as well.

Reforestation and silviculture are techniques that do not require a huge amount of research and some success in tropical forestry as well, reforestation, silviculture. These are techniques that do not require a huge amount of planning time to put into effect, and also they are fairly low on the cost scale, primarily because they provide multiple benefits. I would like to emphasize this theme because I agree with the Energy minister's remarks that a principal component of any policymaking at this stage of the game has to focus on the implementation of so-called high-leverage policies, policies that make sense in their own right and do not depend exclusively on global warming to make them make sense.

For instance, I would like to just come back to your remark about a mechanical photosynthetic device. There was actually some research that was going on at Argonne National Laboratory a few years back to develop such an artificial chloroplast, but now would not be the right time to implement such a strategy because it is devoted exclusively to removing CO₂ and does not produce any other economic outputs. It does not solve, ostensibly anyway, any environmental problems.

On the other hand, the cessation of deforestation and the increase in reforestation rate to result in a net reforestation over the world's surface would have the benefit of stabilizing soil, and as you are well aware, soil erosion is a globally

important problem. It has the potential to provide economic outputs if it is managed properly. The extractive reserve concept is something that bears scrutiny in less-developed countries, and so forth.

Energy efficiency is not on this chart, but it also ranks down in the corner near forestry in low initial planning time and relatively low cost if you include avoided costs, the costs of air pollution in terms of public health, the cost of acid rain, which is also a product of fossil fuel combustion. Just moving on, sea defence—building sea walls as an adaptation strategy to global warming—is extremely high cost and I do not think it should rank high, on the short time scale anyway.

These are some ideas for near-term CO₂ emission reductions policies. As I said, we like ending deforestation because not only does it stem the release of CO₂ from deforested areas, but it also increases the probability that many wildlife species will not go extinct. Coupled with planting trees—even if we do not plant trees on the scale of Australia, and we do not want to look at reforestation as the sole policy that we do, for that reason. It is just not feasible to plant enough trees to allow us to continue to burn fossil fuels at the rate that we do. It has to be part of a policy mix and it has to be designed in such a way that it maximizes the environmental benefits and the economic outputs.

One idea that we are pursuing at the Environmental Defense Fund is to couple reforestation with the conservation reserve program in the United States, in which there is a pot of money available to subsidize the conversion of farm land that has not been in use in an attempt to get farmers to conserve soil. They take it out of production and they plant whatever they want. We would like to couple that with reforestation and use the money to subsidize tree planting and thus solve a couple of problems at the same time.

In the middle block, increased energy efficiency, I do not think I have to go on and on about how wonderful that is. I believe there is a consensus in this room that it is a high-leverage policy, and there is quite a potential for fuel switching, as well. There was a little bit of talk about natural gas this morning and earlier this afternoon, and the reason that is a good idea, of course, is that coal and oil have a far higher carbon dioxide output per BTU than natural gas.

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I gave a talk like this at the Southwest Energy Council, a bunch of legislators in Texas and Arkansas, and they are very much in favour of

fuel switching because they are sitting on very large natural gas reserves. So some people will win from this, but the idea of a carbon tax to make the market more closely reflect the full environmental and social costs is an appealing one, because as you were saying in your comments about corporate average fuel economy, you have to couple some kind of economic incentive with any kind of regulation, such as an increased fuel-efficiency standard, in order for it to be effective.

Eventually, of course, we are going to have to implement alternatives to fossil fuel energy because energy efficiency cannot solve the global warming problem by itself. It can buy us time. We think that a 20 to 30 per cent cut in CO₂ emissions by industrialized countries is quite feasible, with a rather gradual and economically feasible program to increase energy efficiency and fuel switching. But at the same time, research and development should focus on and be more highly funded on energy sources that do not have these detrimental environmental consequences that fossil fuel combustion does. I will not dwell on that, because we are running out of time.

I just wanted to end this part of the presentation with an example culled from CFCs again. You know, we do not have much experience in dealing with global problems internationally, etc. The CFC ozone depletion problem holds many lessons for us, and I think one of them is that politicians should not underestimate the political will or the will that exists among the public to take action when it perceives an environmental threat.

In the early 1970s scientists first came out with the theory that chlorofluorocarbons might be impairing the ability of the stratosphere's ozone layer to protect us from ultraviolet radiation. It was a very uncertain theory; there was no smoking gun at that time. There was no inkling that an enormous ozone hole would open up over Antarctica, but even at this early stage consumers chose not to buy CFC-containing products, and that in turn motivated corporations to provide them with alternatives.

Then shortly after that, the Environmental Protection Agency promulgated regulations that said that CFC aerosol propellants are a bad idea. So in some cases official policy can follow consumer action. I think this makes us optimistic that this seemingly intractable problem and the nature of coming to grips with global warming—we can be optimistic about that as well, even though fossil fuel combustion is much more

inextricably mixed with how we behave and how we act than were CFCs.

Now let me just briefly go over in a little bit more detail some policy tools and policy responses. I think it is important to realize that there are things that we really must do on a very short time scale if we are to buy time to make wise policy decisions later and also allow scientific research to catch up with us. One of the things, of course, is to eliminate CFC production. We really should think hard about government policies that encourage coal use and subsidize electricity consumption.

The energy efficiency point has been made many times, and as I said, we think we can cut CO₂ emissions by 20 per cent by 2000 through a mix of policies. The deforestation and net reforestation program we recommend would combine debt-for-nature swaps, a focus on markets for unsustainable products perhaps, an international protocol to predicate the importation of tropical woods and other natural products on evidence that they are sustainable harvests, extracted reserves, and soil conservation programs. Again, this idea of maximizing benefits for any policy and developing a policy that makes sense in and of itself will also buy us time to respond to global warming.

In addition, it is the province of governments to look at the long term. This whole policy question really depends on the time scale on which you are attuned. Corporations with a short-term outlook really do not have any incentive or any motivation to look further down the line, but that is the role of governments and environmental groups. We all tend to take the longer view. Long-term policies include more government investment and research and development of technologies to decrease greenhouse gas emissions. As I mentioned, new energy-efficient technology and also increased development of alternative energy technologies is needed.

One of the ways in which, I think, Canada can take a leadership role, as I take it to be a goal of Canada and also Ontario to be, is to look at this question of equity with developing countries. This is a major sticking point in the development of a framework negotiation to address global warming internationally. As you know, Toronto, the city, can do its part, and Ontario, the province, can do its part, but in the final analysis it is an international problem.

Leadership can be by example, and I think it is laudable and appropriate that it be so, but at the same time, we have to do some hard thinking

about how to bring developing countries on to this policy vote, how to allay their concerns that there will be excessive costs associated with signing on to any international protocol and convention that calls for decreased CO₂ emissions across the board around the world. We have to come up with a formula to allow them to develop increased quality of life and so forth and subsidize, in my view, their development of energy efficiency and renewable energy technology. If we do not do that, I do not think there is much of a chance that a convention can be signed.

Another point I would like to stress is the need for an overall strategy that combines acid rain control, urban air pollution problems, dependence on imported energy and the reduction of risk of global warming. Again, this goes back to the need for interagency co-ordination and the need to check that everyone is acting in a coherent fashion, that policy is not being made in transportation that does not make sense in terms of a global warming policy.

We, as a group, are strong advocates of the next point: allowing markets to incorporate risk of climate change by assuring that prices of fossil fuels and other greenhouse gas sources reflect their full, I should add, environmental and social costs. One way to do this is to impose emissions fees. Another way is to establish standards, such as a CAFE standard, a corporate average fuel efficiency standard, and permit makers of automobiles, for example, to earn emissions credits by going below that CAFE standard. In other words, they receive a permit to discharge a certain amount of carbon dioxide in line with your national goal of reducing carbon dioxide emissions.

That is a very important point. No tradable permit scheme can work without some kind of cap that goes along with it. You have to establish the goal which you want to achieve first. Then you can use emissions-trading programs to increase the economic efficiency of getting to that goal. We have developed a proposal for discharge permit trading with regard to sulphur dioxide in America. We hope that the Congress will allow that component of the revised Clean Air Act in the United States to become policy so that we can see how it works on a national level, and we hope that it will provide a model for CO₂ discharge permit trading in the future.

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In conclusion, I would just like to say that I completely agree with Mr Charlton's remarks earlier that standards should be used to force

technology. I hope I am interpreting you correctly. There is a real danger in undertargeting. Policies should seek to set high standards. In an optimal world, of course, those standards would be based on environmental criteria, such as was the case for acid rain legislation in Europe, in which critical loads or the amount of sulphur dioxide and nitrogen oxide that an ecosystem could absorb without being detrimentally affected was used to develop a target backwards, rather than coming at it from the front end and saying, "This is what we can do and this is all we can do."

In our view, it is better to try to find a target that makes sense environmentally. In the case of climate change, a 20 per cent reduction in CO₂ emissions is a good short-term goal because it is based on the idea that such a reduction would allow the climate to warm slowly at about 0.1 degrees C per decade, and this target might be enough for ecosystems and mankind to adapt. It is a slow enough change so that we could not have disastrous effects right away and have time to develop good policies.

I will stop there and be happy to entertain questions.

Mr Brown: The first question I have to ask maybe is a technical question. It occurs to me that when we burn fossil fuel or get energy from anywhere, we create heat energy, obviously in cities. It is warmer in Toronto than it is just out in the suburbs. I was wondering what effect that has on global warming in the scheme of things. Is it very minute?

Dr Fujita: It is not something I have studied, but my guess would be that it would be fairly minute compared to, you know, the 25 per cent increase in carbon dioxide concentration that we have seen since the Industrial Revolution.

Mr Brown: So if people have not factored that into their models, it is so small it probably does not have a major effect.

Dr Fujita: I should qualify that by saying that this heat island effect, the fact that cities do heat up a little bit, has not been important in interpreting the temperature record. I am not sure how important it will be in influencing future climate, but it has led to a small bias in the temperature record since a lot of the temperature recorders are located in urban areas which were not urban at the time the recorders were put in.

Mr Brown: It affects the database.

Dr Fujita: Yes. So it could have been that we were just seeing the effect of citification, but the

bias turned out to be fairly small in comparison to the 0.5-degree trend.

Mr Brown: My other question has to do with the fact that I am, I think, the only northern Ontario member here today.

Mr Callahan: North of Sudbury.

Mr Brown: Yes, right. One of the things that I do and, I suspect, most of my colleagues do is attend crown land management meetings, where it is decided how the province is going to allocate the forestry in the area. It is a very complicated matter. I was surprised in my area that 60 per cent of the forest is overage. It is probably past a point to really cut it economically or do anything with it. That means, when you look at the area, that at best 40 years of that forest is being reproduced right now because the average time line for a tree is 60 or 70 years in the species we are talking about.

I am very concerned that our forestry practices have not taken into account any of these things. When you add the fact that we have not been particularly good at reforesting what we have cut, it is creating great difficulties, but obviously there is great potential to improve what we are doing. You said that the fastest growing trees are the best as storers of carbon?

Dr Fujita: I did not say that but I certainly agree with that. It has been said several times today.

Mr Brown: It is best earlier in the growth, so really we should be trying to undertake the best forest management and try to reforest as quickly as possible.

Dr Fujita: I think I see what you are leading to, but you have to temper it with this multiple benefits idea. For instance, strictly from the point of view of climate stabilization, it might appear to be a good idea to cut down the Amazonian rain forest and reforest it with eucalyptus trees or locust trees or silver maple, but that does not make too much sense in terms of the loss of biodiversity, the loss of livelihood by indigenous peoples, all the other benefits that come along with having the Amazonian rain forest.

It is a tricky policy call. We are all for stabilizing the climate system, but you have to weigh the costs and benefits and I think that if you can combine reforestation efforts with soil erosion control and other outputs, then it makes better sense than to just simply put in tree plantations that are designed to maximize carbon dioxide out-take.

Mr Brown: I guess the point was that I do not think we have taken this into account, although

obviously we are trying to take into account a myriad of other factors, but it is not something that people have looked at very closely, to this point anyway.

Dr Fujita: I certainly agree with that and I would recommend that global warming become a criterion for policy development in other sectors, such as forestry. For example, the United States Agency for International Development recently received a mandate from Congress to try to incorporate this idea of limiting the rate of climate change and maximizing environmental benefits in its overseas operations and its foreign aid projects. We are trying to convince Japan to do the same thing as it restructures its foreign aid and expands its foreign aid program.

The Chair: I wonder if I can leave the chair and insert myself here with a question. I am very interested in the emphasis that both you and Dr Somerville have placed on emphasizing the targets, emphasizing that our targets are appropriate and that moving to take action according to a target is probably a well-managed approach from a public policy point of view. I am also interested, though, in looking at our projections for Canada that if we consider that from today's emission levels of CO₂, with predicted increasing use over a period of time, in fact the 20 per cent by 2005 becomes about 80 per cent of current emission levels. I am wondering if, given that kind of mathematical scenario, the kinds of issues you have raised and the possible public policy decisions in the short and medium term in fact mean a great deal if you are looking at 82 per cent of today's emissions.

Dr Fujita: I am not sure I understand how you come up with the 80 per cent. Can you rephrase that, please?

The Chair: Working from current emissions in Canada—the numbers I have seen for current emissions in Canada; presumably we will have figures that will be placed before the committee—working with current estimates of increase in energy demand over a period of time by maybe 2050, the figure would be an 82 per cent decrease from today's emissions, less than today's emissions, required to meet those 20 or 25 per cent reduction targets.

Dr Fujita: And your question is?

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The Chair: My question is, are the fairly slow and easy approaches you have outlined realistic in terms of a scenario that an internationally demanded target of 20 per cent reduction annually—do they in fact become feasible or even

valid when we are looking at predictions with no change at all today of 80 per cent less emissions?

Dr Fujita: I was not aware of that scenario for Canada. As I understand it, you were saying that given projections for energy demand, the emissions are going to drop substantially?

The Chair: Given current predictions of increased energy demand?

Dr Fujita: Yes.

The Chair: No. To meet the target of 20 per cent, we would have to reduce emissions by 82 per cent.

Mr Callahan: That is acid rain.

The Chair: No, that is carbon.

Dr Fujita: I am not sure how to respond to that. I am sorry.

The Chair: Okay, thanks. Perhaps we could talk about that later.

The other question I want to ask relates to fuel switching and the time line of the emission life in the atmosphere. If, by example, natural gas becomes a preferred fuel over coal, natural gas has more of a methane emission than coal. Is the lifetime of methane in the atmosphere substantially longer, more of a danger, over the longer period than carbon dioxide?

Dr Fujita: Let me clarify one point. Natural gas is methane, so by burning natural gas you are—

The Chair: Yes, but there is still a methane emission.

Dr Fujita: You mean leakage and so forth.

The Chair: Yes.

Dr Fujita: Yes, that is a question that has come up. As you increase the infrastructure for distributing methane around, will the benefits of reduced carbon emissions per unit of energy be outweighed by leakages? That is something we are uncertain about. We have not done an analysis of that. I think we are in the midst of a study out of our California office to try to go back through these fuel-switching scenarios and see what the potential leakages really are.

The Chair: Would you be looking at whether methane may be more significant in the atmosphere than CO₂?

Dr Fujita: As far as global warming goes?

The Chair: Yes.

Dr Fujita: The point I tried to make was that carbon dioxide, although it does not trap as much heat per molecule as methane, still accounts for about half of the total forcing, or the total amount, of heat trapping that goes on by

greenhouse gases, and because it lasts longer in the atmosphere that does not make it any more radiatively effective. It still has the same amount of heat-trapping potential per molecule. It is just that it will not respond as quickly to what we do as methane will. So we have to begin sooner to cut CO₂ emissions than we would have to for methane, because if we cut methane its concentration in the atmosphere would drop relatively rapidly, whereas with CO₂, if we cut emissions they would stay high for a longer period of time.

The Chair: Mr Charlton, with a supplementary on the same issue.

Mr Charlton: It is a supplementary that goes back to the line of questioning the chair started, which you felt a little uncomfortable responding to.

Dr Fujita: Yes, I still did not fully understand it.

Mr Charlton: Okay. The comment that elicited the chair's question comes from a study that was done by our electrical utility, Ontario Hydro, in which it shows—I can let you have a look at this if you like—how reducing 1988 emissions to 80 per cent of the 1988 level would in fact require an 82 per cent reduction if you take into account the projected increase in demand for energy use over the next 20 years.

Mrs Grier: Hydro's projected increase.

Mr Charlton: Right. The chair asked the question, in terms of the list of policy options you set out as an approach to starting to deal with the question of reducing emissions, whether they were valid when you were trying to deal with 82 per cent and not 20 per cent. The reality in her question is that her question assumes that the increased demand or the increased use of energy, specifically the increased use of fossil fuels, even in the utility's demand study, is going to in fact occur.

One of the things, for example, that we all know about energy efficiency is that very fortunately for all of us it happens to be an approach to this question which double-counts. In other words, for every energy unit of efficiency which you put into the system, it not only reduces emissions but it also reduces future demand or growth in demand. So the 80 per cent or 82 per cent to which she was referring does not become a reality if you proceed with the kinds of policy options you set out. Perhaps that has explained things a little better in terms of what she was trying to get at and you are better able to comment now.

Dr Fujita: Yes, I will give it a try. Thank you for clarifying that. Sorry I did not understand it. My comment would be, first, that we have not thought of that as a problem in those terms.

Mrs Grier: How very fortunate. You mean you do not have Ontario Hydro doing your figures?

Dr Fujita: No, I am sorry, we did not take that into account.

Mrs Grier: Count your blessings.

Dr Fujita: I think that the policies we recommend—the general principle of trying to increase fossil fuel prices, whether it is through a carbon tax, whether it is through a gas tax, whether you put in an emissions trading scheme or not among all sectors, would have the result of decreasing demand and so we do not assume, as Ontario Hydro does, that the demand will increase. It is sort of cart before the horse. We are assuming that we will cut demand first.

It is rather like the air pollution problem in Denver, where there are air quality criteria in effect to protect Denver's air quality, but the transportation board is planning to increase infrastructure to accommodate the growth in vehicle miles travelled rather than try to decrease the demand for infrastructure by aiming at achieving the air quality criteria. It is a similar sort of problem in my mind. We cannot make that assumption, as you know, because we have to fill out this policy on decreasing the demand so that the scenario does not come true.

Mr Callahan: Maybe this is unfair, but we all recognize that what is done by one country or one province or whatever has a minuscule effect on the total problem and you have to start some place. I do not know whether you have looked into this or whether perhaps the other gentleman who addressed us looked into it, but how do you account for countries like China, which is attempting to emerge as a strong industrial nation and probably is going to resort to fossil fuels at least at the outset? How do you account for places like eastern Europe that has now become, so-called, no longer communist, and then when we look at Chernobyl?

I was listening to it today coming in in the car. They are having elections in the Ukraine now, and because of Chernobyl there is no way that the Soviet Union would ever, under this new change of political climate, be able to stuff those nuclear reactors totally within the Ukraine. So where is Russia going to get its energy from to reindustrialize itself, because its economy is just in a downfall? I think it is tremendous to take that first

step, but I think there are real difficulties with what has gone on in the last five years, four years, three years, politically around the world, to expect that we will even be able to put a dent in it.

1620

Dr Fujita: I would disagree with that. First, let me address comments about the developing world. I tried to make the point, and I apologize if I was unclear, that this global bargain has to emerge between the industrialized countries and the developing countries if the global atmospheric problem is ever going to be solved. This has become a major bone of contention in the development of negotiating stances. It is quite true that China will burn its coal reserves since it is sitting on large coal reserves. Why should it sign a protocol that asks it to reduce its emissions by 20 per cent, especially in view of the fact that industrialized nations contribute 70 per cent of the problem and the United States alone contributes 20 per cent?

What I proposed is a focus first on the G-7 countries, the large economies of the world, as a group, to reduce emissions by 20 per cent, try to reach this 20 per cent emissions-cut goal set at the Toronto conference, and adopt a protocol which allows industrializing or developing states to slide a little bit, not to meet that goal immediately, to give them leeway for growth, and also make provisions for financial assistance to those developing countries to meet the incremental costs of achieving the targets set by international protocol.

One of the ways that could be achieved, which we are studying now, is technology transfer mechanisms which subsidize the transfer of energy efficiency technology to the developing countries, so that we do not fall into this trap of China, for instance, not being able to afford state-of-the-art technology and buying a very dirty, coal-burning plant from Japan just because it is there and it cannot work in Japan any more. We need to set up a more intelligent structure so that the best technologies can be put in place.

Eastern Europe is a unique opportunity to restructure economies and infrastructure in a way that is more environmentally benign. We have started to engage in a dialogue with Hungary and the Soviet Union, setting up conferences for utility operators, government officials, industrialists, to try to make sure that the new markets that are there—there is a new market economy that is emerging in eastern Europe—take environmental and social effects of fossil combustion

into account, so they can avoid the distortions that our market system has in it.

You can look at it as either an impediment to achieving some of these long-term goals, or you can look at it, as we do, as a unique opportunity to achieve a more equitable and more realistic market that will ensure that the environment is protected because all the costs reflect environmental effects, as well as economic effects.

Mr Callahan: Just following up on that, I noticed your last, or maybe next to last solution for allowing industrialized nations to reduce their emissions was nuclear energy.

Dr Fujita: Right.

Mr Callahan: That strikes me as strange, really, because that is probably the fastest way to achieve this end, assuming we have the technology to dispose of the waste and also, I suppose, to get around the hypersensitivity of people in terms of the dangers of nuclear—I guess in the United States, Three Mile Island, and in eastern Europe, at least in the Ukraine, Chernobyl. Is that a consensus? Is that the approach that most of the people who are involved in trying to reduce the amount of emissions take, that the final effort should be nuclear?

Dr Fujita: Do you mean the last on the priority list?

Mr Callahan: Yes.

Dr Fujita: No, obviously Bechtel is very much in favour of increasing nuclear power and Japan, as a government, is very pro nuclear.

Mr Kerrio: Well over 100,000 megawatts.

Dr Fujita: Right. The reason it is last on our priority list is we have major problems with it. We have an open mind on nuclear energy but we think that the nuclear waste disposal problem has not been solved. In addition, there are concerns about the amount of carbon dioxide that is required to manufacture a nuclear power plant.

There are some studies that have come out that claim at least that the carbon dioxide savings that would be realized by putting in a nuclear power plant might be offset by the amount of carbon that is put into manufacturing the plant, given its relatively short lifespan as an operating facility.

I am not sure whether those numbers are right but there are sufficient problems with it, from our point of view of protecting the environment in all its aspects, not simply from the global warming perspective but from radioactivity and other hazards, that we place it low on our priority list. Not only was it last, but it had a very large question mark after it.

The Chair: I have Mrs Grier on the list. I should tell you that my figures came from the Alberta Ministry of Energy and they were national, although the point that Mr Charlton made indeed reflected the same argument.

Mr D. R. Cooke: Same figures?

The Chair: Same figures but different jurisdictions and different researchers.

Mrs Grier: I want to come back to the question of goals because I am tending to get confused. I hear you supporting the 20 per cent reduction that was the goal of the Toronto conference but we also have before us a discussion paper, and I would just like to read you a couple of sentences and then have you explain them to me.

"The goal of stabilizing concentrations"—and I raise it because you used the word "stabilizing" as well—"of the greenhouse gases in the air goes beyond stabilizing or even reducing emissions by some amount by some time and it is broader than just stabilizing the concentrations of carbon dioxide, which was cited as an imperative goal by the Toronto conference."

Dr Fujita: That is absolutely true. All stabilization means is that the concentrations cease to increase. In order to get at that goal, you have to both reduce emissions and increase the sinks, and that is why I presented this mixture of policies, including reforestation, in addition to efforts to reduce emissions.

Mrs Grier: Okay, but if your goal is stabilization of the concentrations, does that imply a reduction?

Dr Fujita: Yes. In my view, you have to reduce emissions to achieve that goal. Otherwise, the concentrations will continue to increase.

Mrs Grier: How much do you have to reduce emissions? Is that a greater or a lesser goal than the 20 per cent reduction?

Dr Fujita: Recent estimates are that more than a 20 per cent reduction is required.

Mrs Grier: To stabilize concentrations.

Dr Fujita: Yes, even if you couple it with cessation of deforestation and an increase in reforestation, increasing these sinks for instance. A report that came out of the University of East Anglia, for instance, that specifically addressed this question of how we achieve these goals, done by P. M. Kelly, indicates that about a 30 per cent reduction in emissions is required. That report has not been peer-reviewed yet, but it is an example of newer estimates that are coming out

with this goal in mind. Not much analysis has been conducted since the Toronto conference to come up with better numbers for goals.

Mrs Grier: I guess I do not understand what you are saying then, because stabilizing to me means remaining at the same level.

Dr Fujita: Right.

Mrs Grier: The Toronto conference was a reduction of 20 per cent from that level. You are saying stabilizing would mean an even greater reduction. Is that from today's level, or are we back into making assumptions about an increase and reducing from that assumption?

Dr Fujita: No, from today's level. Part of the problem is that some of these gases do last a long time in the atmosphere, so some are left over from previous emissions, but in my view, it is important to decrease emissions if we are ever going to stop concentrations from increasing.

1630

Mrs Grier: You showed us a series of policy options and said you thought there was consensus on energy conservation, I think there is consensus that energy conservation is a good thing, but there are real differences as to the degree of energy conservation that can be attained and the tools used to obtain that conservation. When you are giving it as an option, are you talking about natural conservation, driven by the goodwill that reduced aerosols in the 1970s, or are you talking about incentive-driven conservation, and how do we begin to make those determinations?

Dr Fujita: I think it is clear, at least from the United States point of view, that incentives are required. For instance, when oil prices did increase dramatically during the oil crisis, only then did we see very large increases in efficiency. I think that stringent standards are required and incentives need to be put in place if we are ever going to realize the degree of energy efficiency that is needed.

Mrs Grier: So, just to turn that around, the amount of energy conservation that could be attained without incentives is not going to be sufficient to achieve the goals of reducing global warming?

Dr Fujita: I would not want to depend on that. That is all I am saying.

Mr McGuigan: Dr Fujita, I have a friendly question. I say "friendly" because I do not want you to misinterpret it. Where does the fund get its money from?

Dr Fujita: We are entirely supported by private foundations and citizens.

Mr McGuigan: Could you explain a little more on that?

Dr Fujita: Our membership is about 150,000 and they just make small annual contributions. The remainder of our funding comes from philanthropic foundations, such as the Rockefeller brothers' fund and so forth, for specific projects that we are doing. We do not take any funding from the government or from corporations.

Mr Callahan: Smart move.

Mr McGuigan: A couple of technical questions: I noticed in your graphs you said that CFC production was rising again, following an initial drop. I wonder if you could explain a little bit more about that.

Dr Fujita: Yes, it is because this ban on aerosol use was not universal. That is one cause. It is still quite common in many countries to see CFC aerosols. The other reason is that electronic solvent use of CFC has gone up and Japan now has become a leading producer of CFCs, and user of CFCs too, in its electronics industry. Those are the two major causes.

Mr McGuigan: It is not being used as a propellant, though, as much as it was before?

Dr Fujita: Not quite as much, because it is now banned in our country, but it is still in use.

Mr McGuigan: On the question of methane, this is a figure that goes back to the energy crunch in the early 1970s. A figure I remember is that the Middle East was producing about 16 millions barrels of crude oil a day, but flaring off the equivalent of eight million barrels. What progress, if any, has been made in that direction around the world in recovering the energy in that gas and also reducing the amount of materials that are going up to the greenhouse effect?

Dr Fujita: That is an excellent question. Unfortunately, to my knowledge, there has been no progress. There has been a little progress on the solid waste front, in that some entities and some corporations are starting to tap solid waste and draw off the methane, but to my knowledge, there has been no progress in decreasing the flaring off of natural gas. It is a terrible waste.

Mr McGuigan: I am asking this as a question. It must be an enormous amount that is going into the world from around the world.

Dr Fujita: Yes, sir, I assume there would be.

Mr McGuigan: Even in Canada, you can find it out in Alberta. As a matter of fact, you can find it down where I live. There is a small gas field there—

Mr Callahan: Put a lid on it.

Mr McGuigan: In making inquiries to the Ministry of Energy, it says—I am talking about southwestern Ontario down near Detroit—there are some predictions that it is going to be the new Turner Valley of Canada, that as the area develops and we get more of these wells, it will then be economically feasible to join them all together and harness that gas.

Dr Fujita: Methane has an interesting indirect effect too on climate change in that, for example, in Prudhoe Bay or in a very large facility where a lot of oil is being refined and extracted, that gas accumulates and the preferred method for dealing with increases in methane concentration in the facility to prevent the chance of an explosion is to dump halons, the brominated versions of chlorofluorocarbons, which are also effective at destroying the stratospheric ozone layer and function as greenhouse gases. In fact Prudhoe Bay, I think, is the largest single source of halons to the atmosphere because of firefighting.

Mr McGuigan: Just to change the questioning a little bit, I noticed on one of your slides you had a picture there of the role of agriculture. That is my particular background. A number of years ago, I was on a body, the Agricultural Research Institute of Ontario. They were looking at the time at the fruition of the Malthusian theory that we were running out of food. It appeared perhaps that we were in the 1970s. In the meantime we have had the green revolution, which is part of this whole energy scene.

One of the possibilities seen by a number of people is that presently, according to the information that was given to us then, plants absorb about one per cent of the sun's energy that is put upon them; the rest is reflected. They are only able through photosynthesis to absorb about one per cent, but there are two economic plants that absorb two per cent, sugar beets and sugar cane. The obvious proof of that is the sugar, the carbohydrate, that they store. The other is that certain plants, as I think Mr Pollock mentioned, have the ability to pull nitrogen out of the air in symbiosis with bacteria that live on the roots.

Marrying that with our ability now to select genes and pick them out from one plant and put them in another—in fact the classic example you talked about is taking whatever it is in a firefly that makes it glow in the dark. They have been able to take that out of the firefly and put it into tobacco so that our tobacco—

Mr Callahan: So you think you are smoking?

Mr McGuigan: You do not even have to have a match to light up.

Mr Callahan: I will have a pack of fireflies.

Mr McGuigan: What I am coming to is the tremendous potential that there is in agriculture through biotechnology to make these developments and free up just enormous tracts of land to agro-forestry, which leads you to another problem: Where do the trillions or quadrillions of dollars come from that are necessary to make this change?

Other speakers mentioned earlier the changes that are needed in China and eastern Europe, around the world. Whenever you look at agro-forestry and you put any sort of value on the land and then you take a 50-, 60- or 70-year harvest period, it is uneconomic. You just cannot begin to find the money that is necessary in the beginning to take that land, buy it from the present-day farmer, plant the trees and look after them, and they do require a lot of looking after. Where do you get the money to do all of these things? Do the think-tank people address this? Do they have any answers there?

Dr Fujita: It is coming. I do not think anybody has done a very thorough cost analysis. One idea and one advantage of a trading scheme, coupled with an offset scheme for instance, where you would pass a regulation that says that if you are going to produce CO₂ you have to offset it by planting somewhere else, is that it would incorporate the cost into the price of doing business so that the private corporations would pay that cost.

In terms of the global bargain, it is just a question of priorities. At least in the United States, there is plenty of money to go for defence, a huge amount of money, for instance, and we just have to reprioritize and spend that money on environmental costs. It is just a question of political will.

In terms of the global environment again, the money to bring China along and developing countries along so that they do not suffer in an economic sense from a global warming, protocol has to come from the G-7 industrialized nations. There has to be a net transfer of capital to address their concerns that are very legitimate, I feel.

Mr McGuigan: I agree that if the political will is there, it could be done, but it is such an enormous thing—to take people off the defence industries where they are paid at very high wages and put those people at what have to be low wages—is just a fantastic disruption. I would say that it requires greater disruption in North America than is presently being faced in eastern Europe.

Mrs Grier: Why not continue to pay them high wages but put them to more socially useful tasks?

Mr McGuigan: I certainly agree. I just say, how do you do it?

Mrs Grier: Political will.

Mr McGuigan: I am on your side, but how do we do it?

The Chair: Perhaps we can continue the speculation about how we will do it later on after a break. I would like to say thank you to Dr Fujita for joining us today. He has been very gracious with his time. I know that all members of the committee have found this a really fascinating day with Dr Somerville and Dr Fujita following the minister, Lyn McLeod. We can see that the problems are complicated, are enormous and are going to create some interesting sparks around the room as we proceed.

The committee will adjourn formally until 10 o'clock tomorrow morning when Dr Young, who is executive director of the northern wetlands project and Dr Glooschenko, project officer will be our first witnesses. At 10 o'clock, I want to remind members of the committee that Michael Totten, who is environmental aide to Congresswoman Claudine Schneider—I do not know what they call them in the states and I am not being sexist—who has a major global warming bill before Congress, will be here to speak to us about that bill.

We will adjourn until tomorrow morning at 11. The committee itself will convene informally this evening at seven o'clock.

The committee adjourned, at 1645.

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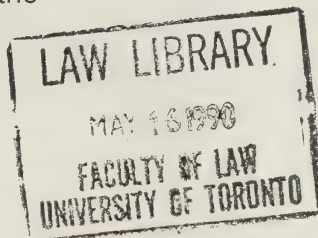
Le mardi 6 mars 1990

Select Committee on Energy

Global Warming and the
Greenhouse Effect

Comité spécial de l'énergie

Réchauffement planétaire et
l'affect de serre



Chair: Barbara Sullivan
Clerk: Todd Decker

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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Tuesday 6 March 1990

The committee met at 1008 in committee room 2.

GLOBAL WARMING AND THE GREENHOUSE EFFECT (continued)

The Chair: Ladies and gentlemen, I think we can get under way.

CANADIAN INSTITUTE FOR RESEARCH IN ATMOSPHERIC CHEMISTRY

The Chair: Jim Young is executive director of the Canadian Institute for Research in Atmospheric Chemistry. I will just give you some background.

After receiving his PhD in food mechanics at the University of Waterloo, Dr Young joined the Atmospheric Environment Service of the federal Department of the Environment as a research scientist in air pollution meteorology. He served as chief of the air quality section of the pollution control branch of Environment New Brunswick and was the director of air quality and interenvironmental research branch of the AES. Presently Dr Young is serving as the executive director at the Canadian Institute for Research in Atmospheric Chemistry and is concurrently acting as director general of the Atmospheric Environment Service. He is the author of 67 original publications and received a government of Canada merit award in 1984 and an Environment Canada citation of excellence in 1989.

Dr Young, we would like to welcome you to our hearings.

Dr Young: Could I ask that Dr Glooschenko join me? We are going to do a joint presentation.

The Chair: Yes, that is great. While Dr Glooschenko is coming to the chair, I will read some of his biography.

Dr Glooschenko received his PhD in oceanography from Oregon State University following a three-year term as a professor of oceanography at Florida State University. He joined what is now Environment Canada at the National Water Research Institute in Burlington as a research scientist. He concentrated on pollution problems in the Great Lakes and his current research is on the atmospheric deposition of contaminants and climatic change. He is a visiting associate professor in the faculty of environment studies at York University, where he teaches courses in ecology. Dr Glooschenko is also studying the ecological impact of Third World development with emphasis on tropical coasts. He is also the co-ordinator of the northern wetlands study, a major research project for CIRAC on the role of northern wetlands on climatic change and on global cycles of carbon, nitrogen and sulphur. Dr Glooschenko is involved with research on tropical wetlands in Latin America and has consulted with agencies in Brazil, Mexico, Costa Rica, Nicaragua and Cuba.

Dr Young: What I would like to do this morning is to give you a presentation about what CIRAC is and what we are trying to do, then talk a little bit about the northern wetlands project and how it relates to the mandate of this group and then conclude with a couple of remarks about things that we think per-

haps you can do to solve the global warming problem in Ontario.

First of all, what is CIRAC? CIRAC is a unique partnership of government, industry and university. I have passed out to you a list of our current membership—it is a one-pager—and you will see we have a fairly large representation. I think we are up to about 37 members now, and the members in CIRAC are companies or departments.

We are dedicated to basic and applied research in the area of atmospheric chemistry and we are also dedicated to training atmospheric chemists for the future and to educating both the public and others today in the area of atmospheric chemistry. Our membership, as of May, covered about 44 per cent private members, one member at large, six educational members—these are universities—and 11 public members. Those are things like the Department of the Environment, for example.

CIRAC was formed really to take advantage of the whole idea of partnerships. When budgets were going down we formed ourselves, because we thought that if we pooled our small resources we could do bigger budgets together. That, even though it seemed a bit naïve at the time, has worked out very well in the sense that we have got a very large group of scientists interested in this area and we have managed to successfully argue for money from the National Sciences and Engineering Research Council of Canada.

The advantages that we see of partnerships: partnerships are improved training opportunities because we have actual universities as members. We can take an integrated approach to issues because we have experts in various fields. There is an easing of jurisdictional concerns in the sense that what is bringing us together is our science projects. We find that out of that, because we have different backgrounds, there is a real synergism in the project. I think you will get a sense of that when Dr Glooschenko talks about that. It also gives us a broader base of understanding of both the issues and the systems in place to deal with these issues.

Now let me get into the topic. This is just a summary of the major greenhouse gases—I am sure you have seen this before—carbon dioxide being the major one. What I would like to point out here really is the fourth column, the relative greenhouse efficiency. Our presentation this morning will deal primarily with methane, because that is the subject of the northern wetlands study, and you can see that methane has 25 per cent more of a warming effect than CO₂ has. Nitrous oxide, which we do not know very much about, has 230 times, and chlorofluorocarbons about 15,000 times more warming capacity on the climate than carbon dioxide has.

Why am I telling you this? I am telling you this because I want to show you that in fact methane is increasing in the atmosphere as well, not just CO₂, and methane, just remember, is 25 times more potent as a warmer than CO₂. We do not have the latest data here. Dr Glooschenko may show you a little more historical data, but this is really just to point out that CH₄, or methane, is also increasing in the atmosphere.

If we just do a relative contribution, the graph on your left shows you the concentration in the atmosphere of the various gases, the four major groups of gases that cause the greenhouse

effect, and the graph on the right shows you the percentage contribution of those to the greenhouse effect. As you can see, by far, over 50 per cent is caused by CO₂, but you can also see that because of the multiplicative factor methane has a significant portion of that contribution, as do CFCs.

1020

Mrs Grier: When you say CFCs, we heard yesterday that the ones we have not banned still contribute to the greenhouse effect.

Dr Young: That is correct.

Mrs Grier: So when you say CFCs, what is that?

Dr Young: That is CFCs in total.

Let me just spend a few moments talking about this and then we will get into a bit of science. This just gives you some idea of the annual release rates for various types of things that produce methane. The one that we are going to talk about this morning is natural wetlands, which show up as 21 per cent of the total emissions, and that is why we are studying it. I think, for your perspective, what is interesting is that landfills also contribute, as do gas drilling, venting and transmission. This is the area where we think that perhaps your committee can make a bit of difference.

I would now like to turn it over to Dr Glooschenko, who will talk further to this.

Dr Glooschenko: Thank you for your invitation to speak today. I would like to go over some of the sources of methane, just to give you a feeling where this is coming from. As you see, natural wetlands, of which Ontario has quite a few—I will go into that in a few minutes—are still the major source. Yet we know methane is increasing at a rate of one per cent a year, and I think we know just about the opposite for natural wetlands, that they are not increasing. So this points to many other sources that are taking the lead.

Second right now, next to natural wetlands, is this fancy word, enteric fermentation, a rather polite word for saying that animals—cattle, horses, pigs, sheep, camels, what have you—as they digest produce quite a bit of gas. This gas does go into global warming.

The third major source, next to enteric fermentation or animal production, would be rice paddies. In fact, rice paddies are artificial wetlands. When you grow rice you grow it in a very wet habitat.

Certainly, if we were to look at the data, we could see a direct correlation between animals, paddies and population growth. So population is basically the cause: increased demand for rice, mainly in Asia and the Pacific countries, and cattle more in the northern countries. There are many other sources.

Mrs Grier: What does "Tg" mean? How do you measure this stuff?

Dr Glooschenko: Teragrams are millions of billions of grams; 10 to the 12th power.

Mrs Grier: I am glad I asked.

Mr Kerrio: One more trick question before you go through this: Could you describe how much change there might be in its release and the time frame?

Dr Glooschenko: Yes. I have that as my next slide.

One last thing before I go to this is that I just want to point out this last particular column. When we talk about these averages, notice the ranges. We are dealing with quite a big

range now based on our current understanding. So we have, in the case of natural wetlands, ranges that go from something like 100 to 200 teragrams. One of the big projects going on globally, northern wetlands, is to try to get better figures on these numbers. These are quite critical if you are going into a control program, and if you are swamped out by Mother Nature, it might not make sense. So this is, I think, one of the things that we have to firm up, those numbers, because you can see those ranges are quite significant for most particular sources.

If we were to go now to the projections, in terms of trends these are again based on the same averages. If we look at natural wetlands we can see a slight increase. We do not say that we are going to have a growth of natural wetlands, but as temperatures increase probably methane production potential will increase in much of the natural wetlands per se. This might be especially true in the north, that as you get melting of things like permafrost in the tundra you will get a lot more—not a lot, but you will get a certain amount more of methane production because of increases of wetlands in things that now are pretty much tundra. Of course, we do have such systems in the northern part of Ontario.

If we take the two second-most-important sources, rice paddies and ruminants, you can see there may be about a 50 per cent increase for rice, and cattle another 50 or 60 per cent. This I think basically mirrors population trends on the earth.

Biomass burning: This is deforestation, cutting the rain forests. Again, an increase is being predicted there. There is a big conference two weeks from now in Washington, DC, at which the experts on this will be getting together to get better numbers.

I think the significant one for our purposes is, if you notice, the gas drilling, venting and transmission related to natural gas that is predicted to almost quadruple as a source over the next 30 years or so. That is something where we do have quite a bit of activity going on here.

Termites, about the same; landfills, again increasing by about 50 or 60 per cent; other things like coal mining: I think you can see a lot of these things are basically varying in the case of food and population, or in the case of energy you can see it is growing much faster than population.

Mr Pollock: In the ruminants, the cattle population is actually going down; is that not right?

Dr Glooschenko: No, on a global basis it is increasing. If you take conversion in the tropical countries, in places like Brazil, you are getting a lot more. It may be going down now with our habits, but still on a global basis it is increasing.

Another thing too: If you take a country like India that still has cattle, and they do not eat them, the population is going up. So it is not strictly production for the purpose of meat.

Mr Pollock: I guess I am thinking basically that in Ontario the cattle population is down anyway.

Dr Glooschenko: Right, but on a global basis all these gases are increasing. We have to look at a global perspective.

Mr D. R. Cooke: Why are termites significant?

Dr Glooschenko: Termites apparently, as they break down organic matter—again, we are talking about mainly termites in the tropical savannahs—produce quite a bit of methane in the process, in the little ways that they work biochemically. This will be tropical savannahs.

Mr Callahan: The chairman had noted that if you went way back, the warming trend was at a high peak. Would it be

that if your CO_2 is not increased by what we are doing as current human beings, there is greater room for the methane and greater production of methane?

Dr Glooschenko: Yes, this is true. If you look at the increases, methane is increasing at something like one per cent a year globally, which is faster than the rate of CO_2 . So eventually you could predict a scenario way down in the future where methane is becoming increasingly important and will become maybe even equal to CO_2 , but we are talking about maybe hundreds of years.

Mr Callahan: We have been trying to get an explanation as to why there was that high peak way back, maybe 150,000 years ago. Would it have been as a result of CO_2 being at a very low level and the entire earth being very lush with greenery and big animals?

Dr Glooschenko: Yes. If we go back, I think you are talking about some of the evidence back in some of the interglacial times that we had warmer, moister climates and quite a bit more productivity of vegetation and stuff that would be controlling the CO_2 .

Mr Callahan: In that respect, having greater methane is more dangerous than having greater CO_2 because methane—

Dr Glooschenko: It is 25 times more effective per molecule, you might say, in terms of global heating.

The Chair: I do not like to continue this interruption, but could you give us a comparison of the lifetime of CO_2 and methane in the atmosphere?

Dr Glooschenko: Yes, I can go back to our first overhead. If you look at CO_2 , its lifespan is something like two to four years, and you notice there that it is increasing 0.4 per cent. Methane's lifetime is about 11 years, increasing at one per cent. So once we have better numbers we can eventually show how it is becoming much more important relative to CO_2 .

Dr Glooschenko: What I would like to do now is to show a few slides more with respect to the northern wetlands study. One or two of these slides are slightly repetitive.

This is, first of all, one of the trends of methane. If you look at this first slide, this is methane concentration with time, but only since 1976. I think you can see that is a fairly obvious increase that is taking place. These types of data take a long time to gather and process, so this is up to about 1986, and the numbers probably are increasing. Whether the rate is increasing we are not sure, but I think you can see a fairly obvious change there.

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Mr D. R. Cooke: Would the southern hemisphere be the same sort of thing?

Dr Glooschenko: The increase is more in the northern hemisphere, because most wetlands, for example, are in the northern hemisphere, with the big arboreal belts, and second, all the industrial things, the landfill, the natural gas drilling, all these types of things are more of a northern hemisphere effect.

Now this one here, I might just note, is a little hard to see, but if you look at the vertical axis on the left, that is going from the present down to about 600 years ago. We can go up into the ice caps in Greenland and measure the methane content trapped within the ice, and you could see it remained fairly constant to about 150 to 200 years ago, sort of roughly tying in with the Industrial Revolution, and also the large increases of population

on the earth. Then it starts increasing quite rapidly, as you notice, right there. So it is a combination of both industrialization and population. The two went hand in hand.

Now I would like to talk a little bit about the northern wetlands study. If we look at the map of Canada, we find that basically the aerial distribution of wetlands pretty well mirrors the boreal belt of Canada. If we take Canada, I think the latest numbers are 10 to 12 per cent of Canada is covered by wetlands. We are about equal in wetlands to the USSR, which is the second largest thing.

If you look at the Hudson Bay lowland, which is mostly in Ontario, in fact about 25 per cent of Ontario, this is something like between 75 to 100 per cent wetlands. In fact, there is only one larger wetland complex than this on the earth and that is in western Siberia. So if we are interested in methane production from a wetland, this turns out globally to be probably the second most important wetland source there is.

With this in mind, several years ago CIRAC took it on to develop a group of scientists working together in a northern wetlands study to look at the various gases of biogenic origin. There were four purposes there. One was investigating the atmospheric chemistry of biogenic gases and related compounds in the Hudson Bay lowland, with emphasis on the carbon gases, mainly methane—also, we were looking at CO_2 —understanding the physical, chemical and biological processes influencing biogenic gas production and exchange in the sensitivity of the sources and sinks to climate change. We are not only interested in the production, but by sinks we are also interested if any of these ecosystems or soils would have you absorb some of these gases. Third was determining the significance of northern wetlands as a source of biogenic gases to the atmosphere globally. Again, we have to put things in a global perspective. Not only do we produce things that affect the atmosphere, but also other countries like Russia do and all these things go into the cumulative effect. Fourth was characterizing the past and present ecology of wetlands. We need to know how these have changed to know how this particular source has varied.

As you can see, this is a very multidisciplinary, multiagency organization in terms of the participants. In terms of Ontario, York University probably has most participation, followed by McMaster, Guelph, Waterloo, Western and Windsor, and we have a few other Canadian universities. The government of Ontario is a participant, with Ontario Hydro, the Ministry of the Environment and the Ministry of Natural Resources, mainly through the Ontario Centre for Remote Sensing. In the federal government, several different agencies are involved there, and then we are in very close co-operation with NASA in the US, which has a very active group that has worked in the Amazon and Alaska. They will be doing some parallel research to us in the Schefferville area in Quebec and also some work in the Hudson Bay lowland. There is the National Centre for Atmospheric Research and we also have some Swiss participation now.

In terms of the major sites, the base of the Hudson Bay lowlands study will be the Moosenee area. We will have a field camp in Moosenee. Schefferville will be a second site in northern Quebec, where mostly NASA will be participating. There will be some activity in Churchill and at Fraserdale, which is not on the map here, just north of Timmins, between Timmins and Moosenee. At Fraserdale the Atmospheric Environment Service has an atmospheric monitoring station that just went into operation two months ago, which for at least the next two years will be constantly measuring these gases to look for chan-

ges and trends. Also, by looking at the chemical properties of the gases, isotopes and what have you, they will be able to tell what the sources are, see how many are coming from the lowlands, other parts of Ontario or other places.

Another place is the ELA there in northwestern Ontario, down by Dryden. That is an experimental lakes area where work will be going on on the research.

The NASA aircraft will be based at North Bay. None of the runways are big enough for it anywhere north of there. That will be doing atmospheric measurements in a very sophisticated way by aircraft over the lowlands for half the month of July, until they move over to Goose Bay.

Mr D. R. Cooke: When you are looking for changes there—

Dr Glooschenko: We will be looking for changes, the production rates, changes in the atmosphere, time, events, sources and all that.

Mr D. R. Cooke: Are you expecting that to be natural changes, or is there something we are doing that is harming it?

Dr Glooschenko: I think we will be able to find both. For one thing, as the air masses come over the Hudson Bay lowland, they should be picking up methane due only to natural sources. We should be able to pick that up. When the wind directions come from other places, like the south or what have you, then we should find different amounts of methane, which would be more from things like industrial sources. The NASA aircraft will also be able to pick that up as they fly higher levels. They should be able to look at trends. In fact, one of the reasons for Schefferville is that this is a little cleaner air than northern Ontario. Also, they might be able to pick up stuff coming over the poles from Russia from their instrumentation. So it will be looking at both.

In terms of the types we will be doing, this is just our chain of command, but I think the bottom ones are the most important to notice. We will start with F, the lower right, the Hudson Bay lowland ground base program. We will have a field camp in a remote area of the lowland at a place called Kinoje Lakes. Here scientists will be measuring the actual concentrations of methane by putting chambers in the different types of effluent ecosystems. There will also be towers that will be doing regional measurements, say, for just the locality.

This then will be tied in by two aircraft. One of them will be a Canadian research aircraft from the national aeronautics establishment in Ottawa. They will be flying at low level doing largely regional measurements of methane production, and then the NASA aircraft, which is a higher-flying, more sophisticated airplane which measures a lot of other pollutants, will be measuring at high levels. We will be able to try to integrate these measurements from the ground at the different levels of the atmosphere.

That is that lowland project. The Schefferville program basically is the same but more under NASA. I mentioned the atmospheric chemistry program. That will be based at Fraserdale with its ongoing measurements, plus we will be measuring things in the Schefferville area, both NASA and then ourselves. I mentioned the aircraft program.

The other thing is then, when you see how complex the area is, what we have to do is to take these measurements and try to extrapolate these to, first of all, pretty well all of northern Ontario, and the same measurements to the same systems in other parts of Canada. Eventually, we should even be able to work these same measurements and get good estimates on Russia.

The Russians have this vast wetland complex generating methane, yet they are not doing anything right now, based on a meeting we were just at in Sweden a few weeks ago. But since northern Ontario is basically the same as western Siberia in many respects, our same numbers should be able to extrapolate over there—not politically, but ecologically and climatically. That is the modelling thing, to try to tie these together.

I will just skip over that. These just again are sites where we are setting a transect—various wetlands, from the Moosonee area, from the coast inland to the Kinoje Lakes site there, and these are all very isolated areas that we have to put boardwalks to work in, remote areas. We can only get into the area by plane. At the Kinoje Lakes and all the other sites, we will have to be doing helicopter work to go in and do the measurements. Our headquarters will be based there just by Moosonee. We will have a laboratory set up, computers; visiting scientists will be housed in there.

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The last few slides are just a few aerial views of the lowland, just to get a look at the complexity of the wetlands and the type of terrain we will be working in. It is a very complex area to work in, because all of that is wet. If you have been up there, you know what the term "getting bogged down" really means.

Mr Kerrio: You will have to learn to talk Cree.

Dr Glooschenko: We are dealing with the Cree up there. All our documents will be translated, in terms of findings, etc.

That is basically my presentation.

Dr Young: We would just like to conclude by trying to answer some of the questions that you seem to be faced with. I guess we are taking a broader sweep here, because we are looking at all of the greenhouse gases, and the obvious one is to reduce carbon dioxide emissions, but really, the bottom line is that the fewer of these gases you put into the atmosphere, the better off you are.

Recycling helps that, and reforestation helps in the sense that it absorbs some of the gases that are already there. Obviously, some alternative energy sources have different types of emissions. Conservation, again, puts less into the atmosphere. We come to realistic energy pricing. If you make people pay more for energy, then perhaps they will be more frugal with it, and then, again, improve public transportation. In summary, in CIRAC we feel it is prudent to act now to reduce emissions of all chemicals with planet-warming potential.

We want to leave you with a final point, and that is that acting alone will not solve this global problem. You need to encourage others to join with you. One of the ways we thought we might suggest to you to do that is by some kind of twinning with another province in another country. If you can put in place an agreement to jointly reduce, that will help the global problem.

The Chair: You spoke briefly, Dr Glooschenko, about the natural sinks of methane, but you did not emphasize them. Are there extensive natural sinks?

Dr Glooschenko: In terms of methane, probably not. If there are oxygenated, well-drained conditions, the methane produced will break down quite rapidly, but in terms of sinks, no, most of it will get right up in the atmosphere where eventually it will react with various things in the atmosphere. But, no, there are probably no good sinks.

The Chair: Given the impact that landfill sites have on methane production, would you advocate burning garbage?

Dr Glooschenko: If you burn it, of course, you are producing carbon dioxide. If you put something that is biodegradable into a landfill site, where you generally use less oxygen, you are producing methane, which produces more warming. I guess that is one of the types of questions that has to be answered by people who are much more knowledgeable, a sanitary or environmental engineer, but I think that is one of the tradeoffs you have to think about.

Mrs Grier: In conclusion, is there anything we can do about methane, or do we have to keep concentrating on CO₂?

Dr Glooschenko: I think we have to do both. I think we have to concentrate on CO₂, but if you take methane, and if, again, you go to this one figure, certainly we are not going to advocate draining natural wetlands as one of the solutions because these have tremendous wildlife potential and all that. In the case of rice paddies and cattle, there again we are dealing with a food resource for people and I do not think there is much we can do there. Certainly I think we can encourage things like population control in various countries, because that is going to put a lid on these two types of things.

Biomass burning is another thing that is related; deforestation. I was quite pleased to see the new President of Brazil has appointed the best ecologist in the country as the new Minister of the Environment. Hopefully, Brazil now is starting to see global pressure that we have put on there to stop burning down its rain forests for various reasons.

Gas drilling, venting and transmission is certainly an area we can address with better engineering procedures. Again, I am not an expert in that particular field, but there is a lot of leakage in pipelines and in the drilling process and things like that. That is going to increase, especially in places like Alberta, as we have less petroleum around and start going more and more to natural gas, which is I guess going to be a future trend. So that is something I could say.

Termites, I do not think—landfills, again, are increasing here, as we all know, and I think any way we can reduce what goes into the landfill, certainly by recycling, is a major step in that.

Mrs Grier: Can I pick up on that. The things in the landfills that cause the methane are the things that are compostable, presumably, the organics.

Dr Glooschenko: The organics, but even something like paper, even though it will take a long time, still the fibres that make up paper will degrade eventually and the process may grant methane under a landfill situation.

Mr Pollock: It is going to be extremely hard to actually judge how landfills pollute the atmosphere compared to burning it, because landfills contribute year after year after year—who knows, maybe 25, 50 years. You burn it and that is it. It would be hard to just judge that, would it not?

Dr Glooschenko: We could measure the leakage, certainly, of things like landfills and get a rough idea of what we will be taking on over the years. I agree with you. It is a slow release rather than one quick release, but certainly it is measurable.

Mr D. R. Cooke: Just on that point, is it correct that methane release can occur over thousands of years? I have heard the ancient Egyptians' landfills are still releasing methane.

Dr Glooschenko: They still are. In fact, we also think that a lot of the methane coming out of natural wetlands is from old organic matter, old peat and things. Part of that study will be determining how much that methane is recent plant production versus old sources of methane. In fact, as we do warm up, we might be releasing a lot of old fossil, you might call it, methane into the environment. So it is still coming out, no matter its age.

Mr D. R. Cooke: I am disturbed about the figures of growth in gas drilling, venting and transmission and coal mining. We have had coal mining for a few hundred years, and yet it is expected to double in the next 30 years.

Dr Glooschenko: Yes, I think so. Again, that will not necessarily be in Canada, but I think if you look at China, in China coal is a significant thing. As China goes into a bigger industrialization policy, certainly that is one thing. In Europe too, a lot of Europe is dependent on methane from the USSR. In fact, the Russian scientists feel that natural gas production is probably one of the most important things in the world now to look at, as opposed to some of the things we might think, because they feel it is a very significant source in Russia. Then again, Russia is a major methane producer for the earth.

Mr D. R. Cooke: I am not understanding why that causes a problem. What is it that we are doing wrong with that? Can you explain that to me?

Dr Glooschenko: In coal mining?

Mr D. R. Cooke: No, going to gas drilling.

Dr Glooschenko: It is just that there is a certain amount of leakage in the drilling procedure and in the transmission you get a certain amount of leakage that takes place.

Mr D. R. Cooke: So should we be doing research into how we can prevent that leakage?

Dr Glooschenko: Yes. I think it just says that we need improved engineering practices in the area.

Mr D. R. Cooke: I realize this is not your area of expertise, but do you see much happening in that area that you are aware of?

Dr Glooschenko: I think probably, again, with the costs of energy and that, it is prudent not to lose anything these days. As fossil fuels get more and more depleted, certainly there will be much greater needs for conservation measures. So it is a conservation measure. Again, if we went back to something like Dr Young mentioned, realistic pricing, if the price were to go up to realistic costs, then certainly it is going to behoove industry not to have much leakage.

Mrs Grier: Am I correct if I try to interpret this as saying that while we cannot do anything about natural wetlands and we do not want to reduce natural wetlands, as the earth warms, the natural wetlands will produce even more methane than they do now?

Dr Young: We think that is going to happen. We are not sure. As the earth warms, the wetlands may dry out and produce less. That is why we are doing the studies, so that we understand the complete cycle.

Dr Glooschenko: I think we see both, because certainly as you start melting permafrost, and where the most significant warming in Canada is going to take place is in places like the tundra regions, you have more surface water, more wetlands production there. But now if you take the Hudson Bay

lowlands, some of the models so far have shown that area will probably start drying out because of being more influenced by western air masses, which tend to be drier. If that starts drying out, there will be perhaps less methane. Those are things we are working on right now.

When I showed these big ranges between the actual production rates, that is the thing we have to narrow down. Then, by using various models, we can maybe predict and say, "Okay, it looks like the wetlands are going to increase, decrease or whatever." But we are still at the stage where there is a lot of research that has to be done in this area.

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Mrs Grier: What has been the pattern of increase in methane over the last 20 or 30 years? Is that the one per cent?

Dr Glooschenko: The one per cent a year.

Mrs Grier: My local sewage treatment plant uses the gas that comes off it to power the plant. Is that methane?

Dr Young: Yes.

Mrs Grier: Then what are the potentials for harnessing the methane from landfills and from other cases and reusing it? If we effectively cover a landfill—I have seen a landfill where there are pipes where the methane comes out—can we in fact do that and use the methane?

Dr Young: I am not an engineer in that area, but my understanding is that you can collect methane from landfill sites and reuse it the same way you do in your treatment plant.

Mrs Grier: Does that take it out of the atmosphere, or does that only mean it gets redischarged at some secondary stage? I see somebody behind you trying to answer that question.

Interjection.

The Chair: We were not able to pick that up for the record, but perhaps we can go further into it. Mr Totten is our next witness, so perhaps we can have him repeat that at that time.

Mr Callahan: This may sound like a silly question, but I gather that the rice in the rice paddies is not the problem; it is just that the rice paddies are equivalent to our wetlands. Is that right?

Dr Glooschenko: Yes.

Mr Callahan: We have composted. That was a big thing; still is, I guess. I gather if composting really caught on—and I do not know whether it has or it has not—it would add considerably to the methane.

Dr Glooschenko: No, it would not. When we are growing agricultural crops, with the exception of rice which requires this wetness, in a natural soil it is not water-blocked. The organic matter there breaks down to CO₂.

Mr Callahan: So composting is a good way of doing it?

Dr Glooschenko: Yes, it is much less on global warming. If you put it in a landfill site, then you get methane; if you put it back in soil that is well aerated, like most garden or farm soils are, it is going to simply break down to CO₂.

Mr Callahan: Why would you get the significant methane you get from a landfill if it was properly ventilated?

Dr Young: Because a landfill normally is not properly ventilated. A compost heap you turn over every once in a while and

aerate it, but a landfill just sits there and has no oxygen, and that is when you start producing methane.

Mr Charlton: You cap it.

Mr Callahan: Pardon?

Mr Charlton: You try to seal it.

Mr Callahan: If I read you correctly, what you are saying is that we are better to have CO₂ than methane.

Dr Young: That is right.

Mr Callahan: So really methane is the more dangerous culprit that has to be looked at.

Dr Young: I would not say more dangerous. All of the warming gases have various heating rates. The CFCs, per unit of emission, are the most dangerous at the moment, if you like.

Mr Callahan: But CO₂, through photosynthesis, is returned to the plant, whereas I guess methane is not.

Dr Young: That is right. But our CO₂ emissions are quite high now. They are higher than they would naturally be and in fact are creating almost 60 per cent of your current warming problems.

Dr Glooschenko: We talked about reforestation. I think I have seen the figure. Just to keep up with the increased CO₂ production, you would have to reforest the earth with forests the area of Australia, which is probably totally unrealistic.

Mr Callahan: We had some figures of 1,000 trees for each person, I think.

Dr Glooschenko: That would be a good idea, but I think—

Mr Callahan: I have to go back to—this may have nothing to do with our current situation, but it was intriguing when the chairlady brought it up—150,000 years ago, which demonstrated a fairly significant peak with nobody around. Clearly the CO₂ then must have been less than it is today with man-produced CO₂. So really the culprit there was methane, I gather. Do we know or can you guess? I guess we do not know; we can guess.

Dr Young: I did not bring slides of that. I think in some of the documentation we are going to leave you there is evidence of a variation in CO₂ levels over the centuries. There have been high periods and low periods. As we say, we do not understand all of the cycles. That is really what some of the projects we are doing are trying to understand. We are trying to understand the cycle in the atmosphere. There are so many things we do not know that we want to learn about.

Dr Glooschenko: We do know, though, that there were some very high periods of CO₂ also in a lot of the interglacial areas back then. Both CO₂ and methane were probably higher at times.

Mr Callahan: How does methane disappear? Is it burned off naturally? When it is released into the atmosphere, how do you get rid of it?

Dr Glooschenko: There are all types of chemical interactions that take place within the atmosphere, where it reacts with other atmospheric gases, with ultraviolet light and all that and then changes to other things, but that is up fairly high.

The Chair: I am going to ask the questioners to try to be brief with their questions from now on. We are coming close to the end of our time period, although we did start late.

Mr Pollock: On the fresh water, I see it is increasing. Where do you get methane off fresh water?

Dr Glooschenko: You find in a lot of lakes, especially northern lakes, that in the bottom you have sometimes not that much oxygen, in some of the lower, deep layers of the lakes. Something like Lake Erie, some of the northern lakes and a lot of prairie lakes fit this description. What happens under these conditions is that the bottom sediments, the organic matter that is naturally produced, when it breaks down will generate some methane. Then when the lake overturns, when it thaws, it can put out a little burst of methane. It is a natural process.

Mr Pollock: Why would that be increasing from 1986 to 2000?

Dr Glooschenko: The main reason there that you might have more of this problem is that as we put more and more sewage and things in lakes, we are building up the productivity, this idea of eutrophication. We expect that a lake which is very eutrophic, with a lot of sewage and stuff at the bottom, would have more of a potential for it, so I would say that figure is based strictly on sewage pollution.

Mr D. R. Cooke: I noticed in your report that you say increases in methane also result in increases in atmospheric O_3 , which is ozone.

Dr Glooschenko: Yes.

Mr D. R. Cooke: Another important greenhouse gas, and that is one of the things you are mentioning when you say it mixes with other gases when it reaches the top of the atmosphere. But I am not understanding ozone very well, either; I thought we were losing ozone.

Dr Young: We are losing ozone in the upper atmosphere, but in fact seem to be producing more in the lower atmosphere. We could solve the problem by interchanging them, but that does not occur naturally. We are doing two things to ourselves: We are increasing the ozone burden in the lower atmosphere and decreasing it in the upper atmosphere.

Mr D. R. Cooke: And the increase in the lower atmosphere is having a greenhouse effect?

Dr Young: No. Well, it does, a little bit, but the major problem of increasing ozone in the lower atmosphere is that it is becoming a health hazard.

Mr D. R. Cooke: Why?

Dr Young: Because it seems to affect runners and their performance; it is an oxidizer, a really strong oxidizer, and it attacks the lung tissue.

Dr Glooschenko: Besides also affecting crops; you can find in southern Ontario that things like white beans are very sensitive to ozone. As we have had some high instances of ozone in the past few hot summers, I think a fair bit of damage has been noticed on some of the plants. It just oxidizes natural chemical substances in the plants, in your lungs and elsewhere.

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Dr Young: I think your question points out very well the implications and the complexities in atmospheric chemistry and why we are studying it, because everything seems to be con-

nected to everything else. What we are trying to do is to sort out how you make judgements without throwing the whole balance out.

Mr D. R. Cooke: Am I correct in my understanding that the ozone layer in the upper atmosphere is a bit of a shield that holds the atmosphere in to some degree?

Dr Young: It is a shield for the rays of sunlight that are coming in.

Mr D. R. Cooke: It holds them out.

Dr Young: Yes, it screens out the more dangerous ones.

Mr D. R. Cooke: If we are building ozone in the inner atmosphere, is it possible that it may somehow provide the protection that we are losing in the outer atmosphere?

Dr Young: Again, I am not an expert in that area. I am sorry, I do not think I can answer that.

The Chair: I have one last question. I wonder if, from your expertise, you would suggest that the federal government's cancellation of the OSLO oil sands project, which stands for Other Six Leases Operation, was in fact a positive step in terms of the kinds of questions that we are dealing with.

Interjection.

The Chair: I am not defending it.

Dr Young: We have not looked at that at all, and I would not like to speculate on it.

The Chair: Have you looked at all at the oil sands projects as a contributing factor to methane production?

Dr Young: No, we have not, not as an organization. A number of our members probably have, but they should speak to you directly. We are more interested in how chemistry works and how you can make good judgements.

The Chair: Are there any other questions from the committee? If not, I would like to thank you both very much, Dr Young and Dr Glooschenko, for joining us today. This has been a useful part of our coming to an understanding of the global warming situation and the chemistry and the science involved. We appreciate also your recommendations relating to the approaches to public policy that can be taken.

Mrs Grier: I would like to ask one question on the twinning that I forgot. You mentioned the twinning suggestion. Is there a comparable jurisdiction? If you were to suggest a comparable jurisdiction—

Mr Callahan: Russia, Siberia.

Mrs Grier: I know. What area of Russia?

Dr Young: It really does not matter, as long as you do it together and do the same things together. You could either do it city to city, where the major emission areas are, or you could do it province to province.

Dr Glooschenko: I might point out that I was at a meeting with Russian scientists two weeks ago. The Russian attitude towards global warming is they welcome it.

The Chair: Yes, we have heard that, and yesterday some of us would have welcomed a bit of it as well. As a matter of fact, we are twinned now. The province has a twinning arrangement with Jiangsu province, and it might be something that we may want to think about when we come to write our report.

Dr Young: May I leave with you a copy of a couple of documents. One talks about the exchange of trace gases between the earth and the atmosphere, specifically with regard to methane, and the other just gives you a general overview of a scope study of the greenhouse effect.

Mr D. R. Cooke: Would it be possible to get copies of your charts as well?

Dr Young: Yes, it is.

Mr D. R. Cooke: I meant to ask yesterday too if it is possible to get hold of some of the charts we saw yesterday.

The Chair: Some of those will be available.

MICHAEL TOTTEN

The Chair: We are now ready to move into our next witness's presentation, and with this we move from the science into the start of an evolution of public policy.

Michael Totten is environmental aide to Congresswoman Claudine Schneider, who has introduced quite a singular piece of comprehensive legislation which includes proposals for actions to deal with the threat of global climate change. Mr Totten is the senior policy analyst working for the Honourable Claudine Schneider from Rhode Island and is responsible for energy and environmental policy issues in her office. He studied the role that energy efficiency can play in enhancing environmental quality, economic productivity and global competitiveness between congressional offices. His most recent major legislative effort is the 250-page Global Warming Prevention Act, which is currently cosponsored by 145 members of the House of Representatives. Mr Totten formerly served as the executive director of the Energy Conservation Coalition, an organization which is comprised of two dozen national consumer, church, environmental and scientific groups. He is the author of numerous publications, including the recent article called Low-Cost, Low-Risk Global Energy Strategy. We welcome you here today.

Mr Totten: Thank you very much, and the congresswoman sends her best regards as she could not be here herself.

I sent up a copy of the bill. I do not know if you all saw it. It is a 250-page monster that has 12 titles and well over 100 individual measures; it is actually about 100 different bills incorporated into one. It was introduced during the height of the heat wave that hit Washington the year before last, when most of the media reporting on the greenhouse problem was gloom and doom, that we basically had to adapt. It left many constituents paralysed that there was nothing to do, and one of the key reasons the congresswoman introduced the bill was that for the last decade she has been very actively involved in promoting energy efficiency and solar-renewable technologies, recycling and population stabilization legislation and a whole range of issues that tie in very nicely with resolving many of the problems related to global warming.

In fact, a number of scientists have advocated a tie-in strategy; that we look at those commonsense, fiscally prudent things that we could do so that if 10, 15, 20 years down the line it turns out that the scientific community's higher estimates were wrong, we would have taken steps that make sense in and of themselves and just more or less bought insurance against a potentially severe situation. We now obviously need another 10 or 15 years' time to take research to figure out which is the realm. Is it going to be just one or two degrees warming, or is it going to be the nine degrees centigrade that now some ecologists are talking about, with the biogenic positive feed-

backs that are not typically incorporated into the atmospheric models? There is real uncertainty that pervades these models right now.

I am going to run through really quickly how this bill was crafted. I sent up a summary of each of the titles that tells you a little bit of the rationale behind it. One of the two reasons that we put the bill together in this fashion was it is really a blueprint for both the administration and for congressional committee chairmen and subcommittee chairmen to look within their jurisdiction at things that they could implement, as well as other countries; we have been talking with a number of parliamentarians from around the world, all of whom are crafting bills. This bill has been translated into German and is being used by the German Bundestag as one of its blueprints of action that it is choosing issues from.

The third thing was that the public opinion polls in the United States show an overwhelming support for unilateral action on the part of the United States to reduce greenhouse gases, even prior to an international treaty. By a three-to-one margin they want unilateral action. This was a poll that was released in December by the Union of Concerned Scientists, which commissioned President Bush's pollster, Vince Bragglio, his firm, to do this poll, knowing that if an environmental group did the poll, the President would not listen, but when his own pollster shows that by a three-to-one margin the voters want action, and it was a larger fraction of Republicans who called for that action than Democrats, it is very difficult for the President to ignore that poll.

Also, you are not going to get constituents to write in on 100 different bills. We wanted to be able to mobilize constituent letter writing to the Congress. It has been endorsed by over 40 national organizations. We have already seen probably well over 10,000 letters come into Congress. One gentleman sent us 4,000 signatures that he had compiled on a bicycle ride through 12 western states, and we just got a call yesterday that there is a potential estimated 20,000 signatures that will be coming in on Earth Day from several concerts that will be held in California calling for action on this bill.

So this looks to be the year when there considerable action in the Congress on it.

Mrs Grier: What is the status?

Mr Totten: There are several measures that have already passed, last year. There are several more that are pending, which I will talk about as I go through my talk. I want to just cover our whole strategy on this. Even prior to the global warming, we had a very serious issue facing us in terms of energy expansion over the next 50 years.

This is the conclusion of a report, the basis of which we used for the energy section of our bill. Energy comprises about two thirds of our bill. This is from Energy for a Sustainable World, an international study that was done by four of the world's foremost experts on energy efficiency. They did this study to ask the simple question, "What would be the implications if we take energy efficiency seriously?"

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On the far left here is the current world consumption, roughly 10 terawatt-years per year. That is 10 trillion watts per year. Conventional energy forecasts show a two to fourfold increase in consumption over the next 50 years. That is just a linear extrapolation of what we have done in the last 50 years to accommodate a doubling of the world population and a quadrupling of the gross world product. Those are the same conven-

tional robust growth rates that are projected out for the next 50 years. In the last 50 years we have seen energy for the most part marching in lockstep with that, so that is the implication.

What the study found is that if we take cost-effective energy efficiency seriously over that same period of time, we could accommodate those robust growth rates while remaining at roughly today's current level of consumption. That has profound implications. This is not by any sense of the imagination trying to go to the maximum energy efficiency potential. This is roughly a 3.5 per cent per year rate of efficiency improvement. To put that in context, between the mid-1970s and the mid-1980s, the US achieved nearly a three per cent per year rate of efficiency improvement. Japan exceeded four per cent. So we have some historical experience along this line.

The business-as-usual scenario has some pretty serious implications. First of all, we would have to do all of the following: We would have to bring an Alaskan pipeline equivalent on every one to two months, build a 1,000-megawatt, or one gigawatt, coal plant every one and a half to two days, a 1,000 megawatt nuclear plant every three to four and a half days, and double OPEC's output to maximum capacity.

The environmental problems associated with that include tripling of carbon emissions from around five billion tonnes per year to over 15 billion, certainly a doubling of CO₂, particularly with the other greenhouse gases that you just heard about; an increase of acid rain; urban smog, particularly in developing countries; deforestation; watershed loss; soil erosion; and a substantial increase in radioactive waste.

Economic problems: Any time historically that OPEC has gone over 80 per cent capacity, we have seen price hikes. In fact, this chart, just real quickly, will show you that. It tracks that the price of energy and OPEC capacity have been pretty tight, and we are approaching 80 per cent again, so as the world uses more energy, we have an ominous threat of price hikes occurring. Also, a large fraction of new plant and equipment investment has been consumed by the energy sector. In the US it was over 40 per cent, up to the early 1980s.

For developing countries, they would have to increase their export earnings 15 per cent per year beyond inflation just to finance this energy expansion. The authors of this report conclude that if they in fact could find the money and implement this, they would not have any money left over for doing infrastructure development or meeting basic human needs.

In fact, the last thing is that none of these conventional energy scenarios in any way looks at whether human needs would be met, which as we all know is a particular concern to developing countries, where population is moving up against carrying capacity, and meeting human needs is one of the best ways of stabilizing population.

Security problems are equally serious. With two thirds of our remaining oil in the Middle East, we can expect more embargoes, potential wars, conflicts.

The nuclear scenario would require going to breeder reactors early in the next century, which would put into commercial transit on highways, railroads and ship lanes about two to four million kilograms of plutonium annually. That is equivalent to about 500,000 nuclear bombs, an order of magnitude larger than the current world nuclear arsenal. Basically, we are seeing ourselves finally dealing with nuclear vertical proliferation, but we would certainly move ourselves right into a very serious nuclear horizontal proliferation.

Nuclear terrorism has an increased probability with a 1,000 per cent increase in reactor sites. In fact, just last year the

Department of Energy put utilities on notice that there was a potential attack and they should be alert.

The benefits of the efficiency scenario include allowing us to reduce carbon emissions from current levels, reduce OPEC capacity dependency, avoid going to a weapons-grade plutonium fuel cycle, large preservation of forest area and, probably the most impressive thing, eventual savings exceeding \$500 billion per year. In fact, those were 1980-81 technologies. The estimate is now closer to \$1 trillion per year.

The authors conclude that because this is an end-use-based analysis, it looks at what kinds of energy needs we need and how can we satisfy them in the most efficient way. We are more likely to meet basic human needs, and we have strong correlations that as per capita income goes up, fertility rates go down. They estimate probably 700 million fewer births over this time frame than the conventional scenario.

As I mentioned, we have already achieved, during the mid-1970s to mid-1980s, about a 2.5 per cent to three per cent rate of improvement. These are some of the benefits we have accrued in the United States: We now require a third less energy per unit of gross national product. Our CO₂, sulphur dioxide and nitrogen oxide emissions are 50 per cent below what they otherwise would have been in the absence of these efficiency gains. We are saving \$150 billion per year on the economy's energy bill. Foreign imports are actually about a half of what they otherwise would have been in the absence of these improvements. Our trade deficit is about \$50 billion less. We have other benefits, like reduction in oil prices, OPEC clout, energy-driven inflation and interest rates. Capital formation is up. In fact, utilities went from consuming about \$45 billion per year in capital to down around \$20 billion, although that is expected to go back up.

This is a report that was released in December. It kind of reflects our bill and what many of the policies will lead us towards. This was released by Renew America, which the congresswoman participated in. In a sense, it is a leadership chart, how much leadership and constituent support can we marshal to shape the future over the next 20-some years.

Our current emissions are 1.4 billion tonnes. That is expected to go up under the current scenario, which would be low efficiency improvements and frozen renewables, about what we have experienced in the last year and a half in the United States, all the way to something that is probably impossible under the current regime in the United States, which would be a very vigorous push for developing the most highly efficient, cost-effective technologies available and a vigorous push on renewables, which I am going to explain.

The Chair: Could I just interrupt and ask a question here. In your current system, in the status quo scenario, what is your prediction of energy growth?

Mr Totten: It varies with each of those scenarios, because each of those scenarios assumes a different level of efficiency gain, which steps down the energy growth. It is more driven by the economics. It assumes conventional economic growth rates in all scenarios.

The Chair: So over that period of time, between 1988 and 2010, you are looking at 27 per cent?

Mr Totten: It takes the Department of Energy's economic growth forecast, and then each of these scenarios looks at an increasing level of efficiency and commitment to renewables. This is the 20 per cent goal that is called for in the Toronto bill and the 50 per cent goal that many have talked about at a

further date than 2010. What I want to do is to suggest that this is achievable at—

Mr D. R. Cooke: Could I ask a question on your previous chart. I am confused by that one, the one that was not coloured. It said 1973 to 1978.

Mr Totten: To 1988.

Mr D. R. Cooke: Are you telling us that has happened in the United States?

Mr Totten: That has happened, most of it between 1975 and 1986.

Mr D. R. Cooke: The CO₂ reduction per capita?

Mr Totten: You can look at it in total emissions, or I suppose per capita, yes. It would be the same.

Mrs Grier: Is that a cut from what they would have been if there had been normal growth rates or a cut from actuals?

Mr Totten: In the absence of the efficiency improvements, it would have been twice as high as we are currently experiencing.

Mr McGuigan: So it is not an actual cut.

Mr Charlton: It is a cut that never occurred.

Mr Totten: It is more for illustrative purposes than anything.

The Chair: It is a cut in the rate of growth.

Mr D. R. Cooke: If we just ignored all the problems, extrapolating numbers—

Mr Totten: No, there were many policies, which I will get into, but a major part of that was the fuel economy standards, where we doubled our fuel economy. That was probably a third of those savings. Another third was structural shifts in the economy and another third was a combination of state standards, like the California building standards and the Pacific Northwest Electric Power Planning and Conservation Act, and generally individual consumer decisions in the wake of large oil price increases. Many in the 1970s were price-driven, but there are many policy instruments, in the absence of a continued increase in prices, which are not expected to rise for the most part through 2005 unless we get above 80 per cent OPEC capacity. We will probably see some price spikes that will occur, but they will not remain high, those spikes. There is strong elasticity, as the people will move into efficiency improvements and bring the oil price back down. In fact, when I get to the automobile section, I will show that if we do not do anything, we are not going to get tremendous societal savings.

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I just want to quickly run through a few of these technologies. The congresswoman talks conservation for 10 years, and everybody agrees conservation is good, but there is no sense of the magnitude of savings nor the profound economic impact it would have, not just on energy savings but on capital savings. I really want to make this point very strongly that we are talking about enormous capital savings, not just energy savings.

As you all know, in many places in the world today candles still provide lighting, for probably half the world's population. It certainly did up until Thomas Edison's time in our country. But when the incandescent bulb was introduced, that one tech-

nological advancement, over its lifetime, will give off as much light as 8,000 candles. It was a true revolutionary advancement in technology. Then along came the compact fluorescent lamp of this decade, and I am very pleased to see in your hallway these are being used.

That compact fluorescent lamp, which is now made by every major lighting company in the world in a variety of guises and wattages, gives you the same quality of light as the incandescent but uses 75 to 80 per cent less electricity, lasts 10 times longer, and over its lifetime will save a consumer typically \$30 to \$50. It will also prevent the combustion, in the case of this 18-watt, of about one tonne of CO₂ and about 25 pounds of sulphur dioxide.

It has become almost a joke at the global climate conferences where this is talked about: How many light bulbs does it take to change the weather? In our country, lighting and the associated air-conditioning consumes one fourth of all US electricity. That is equivalent to half of all the coal burned by US utilities.

This is the equivalent of a small coal mine. This is the Bay Bridge in San Francisco. They replaced the bridge with compact fluorescents. They are now saving \$80,000 a year and preventing the combustion of 300 tonnes of coal each year.

This is a picture of one of the lighting factories. This one is in Maybrook, New York. They produce about six million of these compacts per year. The capital cost of a small-sized compact factory is very impressive. To build a factory to produce two million a year costs \$7 million. In turn, that displaces the need for a 350-megawatt coal plant, with a capital cost of over \$300 million—\$7 million versus \$300 million.

To give you an example of how we are squandering the taxpayers' dollars, at least in our country, last month our Overseas Private Investment Corp underwrote a \$150-million deal with the General Electric Co to refurbish 13 incandescent lightbulb factories in Hungary. It sounded all great for helping the Eastern European economy, but that same \$150 million could have built 20 brand-new compact lamp factories, which would have then allowed a savings of \$6 billion to build 6,000 megawatts of coal plants downstream. That is the type of lost opportunity that we are seeing every day, with the taxpayers' dollars going out the pipeline.

We are seeing this not only in individual countries, through your bilateral aid programs and your corporate promotional campaigns overseas, but also through every development bank, such as the World Bank, that underwrites these loans. These are enormous lost opportunities, and I am going to touch upon this several more times.

I cannot help but focus on exit signs. They are ubiquitous in US buildings; I assume they are in Canada as well. There are about 50 million exit signs in the United States. They typically have two incandescent bulbs inside. They are drawing about 50 watts. They burn out about every 4,000 hours. Maintenance men have to come out several times a year and change them. So throughout the year, it costs about \$60 to operate an incandescent sign.

This is a retrofit package now available for these incandescents. You just peel this off, put it in where the incandescents were and plug it into the socket, and then you just put one of these in, which lasts about 13,000 hours, so the maintenance men are now coming out about every year and a half instead of every third of a year and your savings are 80 per cent on electricity and, obviously, maintenance savings.

This is state of the art: This is solid-state electronic circuitry, a silicone-based, light-emitting diode. I will pass it

around. It has a battery pack. An interesting thing about this is that it draws, first of all, 90 per cent less electricity so you get good energy savings, but because it is solid-state circuitry, it does not need to be replaced until every at least 500,000 hours, and probably well over a million hours, the lifetime of the building basically. In fact the only thing you have to change is the battery pack, about every eight years.

In the absence of electricity, during fire this thing flashes. That is why the fire marshalls in our country love it. It has got twice the capital cost of a typical incandescent sign but pays back within 12 to 24 months. It truly is a revolutionary advancement. It would save us close to \$2 billion a year in exit signs in the United States.

The Chair: Is that a patented product?

Mr Totten: I believe it is, but I am not sure. It is made out of Arkansas.

This is another technology. The fancy word for it is an imaging specular reflector. It is made by 3M and Alcoa. You can either use it with aluminum or—basically, this is it right here. This is a cutaway; you do not have it overhead. But typically, most fixtures have got a white enamel finish. This is a silver reflecting mirror. It runs the full length of the fixture. You can go from the typical four tubes down to two tubes and the mirror allows it to push more light out, instead of capturing it up here. Each tube that you take out represents a \$25-a-year savings for that building.

The other thing that you could put with it, which I am sure many of you are familiar with, is the new solid state electronic ballast. These save energy in about a dozen different ways. If you have any windows, you can basically take advantage of the light coming in and allow this to dim, which not only extends the lifetime of the tubes, but according to our Solar Energy Research Institute, upwards of 50 per cent of all daytime lighting needs could be met through a solar daylighting analysis.

When I first walked into this building, I heard the hum. Now I have probably got used to it, I cannot hear it, but that hum is the old core coil ballasts, which were filled, at least before 1975, I think, with PCBs. They are now being replaced routinely, but that hum is caused by that liquid getting so hot it fuses the wires together. This entirely eliminates the hum. It also eliminates the flicker, because a typical core coil ballast operates at 60 cycles—I know it is different in this country—but this operates at above 15,000 cycles, so it entirely eliminates flicker as well.

What I am suggesting is that you get, obviously, multiple benefits in addition to the energy savings, but overall we are talking about 75 to 80 per cent savings in lighting. We estimate in the US we will save customers over \$25 billion a year and prevent the combustion of several hundred million tonnes of coal.

I really want to suggest windows, which I think are very appropriate for Canada. This is a schematic of where we have come in window design. As you know, a single-pane window, as in the ones used in this building, are about an R1. Through our research programs, we have now developed high-efficiency windows. Every major window company in the United States is now using this. It is the heat-mirror window. It is coated with a film that blocks about a third of the infrared heat from going through. You can use it in one of two ways. In a cold climate, obviously, you want to keep the heat in, so you keep it bouncing off that infrared film. In our hot climates we do it in just the reverse. We keep the heat from coming in from the outside. Our next generation of windows now coming out of the labs will be

what are called smart windows, which will allow it to seasonally shift.

Windows in our country leak the equivalent of an Alaskan pipeline, close to about 1.8 million barrels of oil a day. When this window is fully used, and companies like Anderson Windows, this is now all they are marketing and expect to go to 100 per cent marketing of this in the next several years, we expect to save a half an Alaskan pipeline, at less than \$10 a barrel of oil equivalent, in fact probably in most cases below \$5 a barrel equivalent.

Again, you have got some phenomenal capital savings. This is the factory that puts the coating on. It is located in the Bay area of San Francisco. It cost \$7 million and it produces windows that will save the equivalent of 10,000 barrels of oil per day—a \$7 million investment, 10,000 barrels of oil per day saved—compared to the Eureka Oil platform, being taken out of the Bay down to Santa Barbara, the same 10,000 barrels of oil a day, at a capital cost in excess of \$300 million. Again, we are talking about enormous capital savings far beyond the energy savings.

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Let me quickly touch on refrigerators and home appliances. Basically we have seen phenomenal advancements in appliances. The refrigerators in our country combust their volume in coal each year. This is a super-efficient model which reduces the electric consumption up to 90 per cent. This reduces your coal emissions to a vegetable bin's worth. Currently, this model is hand-manufactured out of northern California and sold only to rural households remote from the grid which are putting in solar photovoltaic cells. By buying one of these, even though the price is two to three times that of a conventional refrigerator, they save themselves instantly \$10,000 to \$20,000 on solar cells. So it has an immediate payback when it goes into mass manufacturing and it is not expected to cost any more than current models.

You can generally go through just about every electrical appliance and find tremendous savings. This is from the Energy for a Sustainable World report, which shows upwards of 80 per cent reductions can be achieved, most of them cost-effective today, certainly with prototypes in the pipeline right now that could be brought on line through a variety of utilities, super-rebate programs as they are called, because they are cost-effective against coal plants.

In the commercial building, I just want to touch very quickly on computers. Computers in our country are very fast-growing in electricity consumption. In fact they rival lighting in commercial buildings, and the Electric Power Research Institute estimated several years ago that between 1988 and 1995 we are going to see an increased need for 20,000 megawatts of power plants to deal with computer growth.

The blue line at the bottom is done by a recent report by our national laboratories which showed that all this phenomenal growth in computers could be met while remaining at that 20 billion kilowatt-hours, through about a half a dozen measures, many of which government agencies could help promote through their procurement policies; for instance, requesting computers that use the CMOS transistor technology, which is what is now being used in the laptops, which basically uses virtually no electricity when it is in an idle/off situation versus the more conventional NMOS technology.

Automatic switch-off devices, just like occupancy sensors for lights: We see all these computers just sitting idle most of the day, all night long and most weekends. It typically costs

over \$100 a year for electricity costs for a computer and a printer. That can be reduced to about \$30 by using automatic switch-off devices and turning off on nights and weekends and a variety of other technologies. I think that is going to be real important. All these technologies can be brought along through procurement.

I have already gone over my half-hour and I am only on the first section of the first title of the bill. I might stop and let you ask me questions.

I do want to touch on motors since there is so much heavy industry in Canada. A recent report on motors shows enormous savings, which I want to mention because I read the Canadian task force report for achieving the 20 per cent goal on Toronto emissions, and for the most part electric motors are neglected.

This study shows that we can achieve between 30 per cent and 60 per cent—this is the bottom fact here—in the electric motor and drive sector at an average cost of half a cent per kilowatt-hour. That would displace, in our country, between 80,000 and 190,000 megawatts and save the industry and the commercial sector between \$25 billion and \$50 billion a year. That is, on average, about 44 per cent savings. The motors represent two thirds of all electricity.

In the task force report, they only identified four per cent savings. They are an order of magnitude below the technical cost-effective potential. I raise that because that task force report concluded very strongly that you could not make your goal, but it left out enormous opportunities, this being one of them, the computers being another one. They were very good on the lighting sector. I can go into the motors in detail, but that is a whole half-hour talk.

Automobiles can just be touched on because the task force report also called for basically, I think, a 30 per cent increase in fuel economy. Our bill calls for a 45 per cent increase, and this is a chart of the cumulative savings that can result from our fuel economy section. The blue hatch is business as usual. This goes back, pointing out what the market will bring about versus what fuel economy standards, rebates and gas guzzler taxes will bring about. We have those three measures in our bill.

As usual, market will not bring a car efficiency above beyond 30 to 35 miles per gallon. This is because the individual consumer does not see gas prices as a very large fraction of the overall cost of operating a car. So we are going to probably peak at 30 or 35 miles per gallon worldwide. We already see this even in Europe and Japan where you have prices two to four times higher than the United States gas pump price. They are not getting the efficiencies beyond 30 to 35 miles per gallon. Even price will not drive high efficiency.

The societal savings are clearly above 45 miles per gallon right now, very cost-effective. That would save us cumulatively, in the US, about 16 billion barrels of oil. That is more oil than we expect to extract off the Atlantic and Pacific coasts and the Arctic National Wildlife Refuge in Alaska. Going to 60 for light cars and 45 for light trucks has been argued by many in congressional testimony as being economically attractive, and that would save a cumulative 22 million barrels. Certainly that by no means stretches the prototypes that have been achieved on the road.

You might have seen these. This is the Volvo LCP 2000. They got a combined city-highway of 75 miles per gallon several years ago when it was road-tested. It exceeds the Environmental Protection Agency crash safety test and, because it has fewer parts to assemble, when it goes into mass production it is not expected to cost any more than the current manufacture. Toyota's AXV got a combined city-highway of 98 miles per

gallon using things like a continuously variable transmission and better aerodynamic efficiency. This is the Renault Vesta. It exceeded 130 miles per gallon on open-road testing several years ago. The fellow who designed the LCP 2000 has come up with a new motor, multifuel-capable, with dramatic reductions in emissions, carbon monoxide and carbon dioxide. It is a very exciting opportunity.

Mrs Grier: Is there no North American example?

Mr Totten: Actually, I need to add General Motors too. I guess their Geo Car gets 55.

I have water and recycling, neither of which were in the task force report, very impressive savings. I will skip that. We have both those sections in our bill.

Renewables—big potential, but I have run out of time. I will pass on that.

Market policies, many of them—I can answer those when we have questions.

I just might mention the overall federal subsidy policy. This was a mid-1980s look at how we subsidize energy. As you can see, the red is the subsidy, the blue is what they delivered. Nuclear got a third of our nearly \$50 billion a year, even though it produced relatively little. Efficiency got relatively little, less than \$1 billion, although it produced one fifth of delivered energy services. Part of our bill calls for assessing how we subsidize efficiency. It also calls for incorporating externalities, which I know you are all familiar with from the acid rain problems which we in the United States just cannot seem to move expeditiously on.

This was testimony given by a scientist at the Clean Energy Research Institute on the social cost not reflected in the price of fuels. It is a highly contentious estimate. The delivered price of oil is about \$7 per gigajoule, which is a million BTUs, versus all the colours and hatch marks, which are the things not reflected in the price: the impact on farms, forests, fresh water, humans, animals, buildings, coast lines and ocean rise, which amount collectively to about twice the delivered price of oil; in fact, more than that. It works out to about \$50 a barrel. That is about \$100 billion to \$200 billion a year in societal costs that we are supposedly incurring from fossil fuel combustion that is not reflected in the prices. I think that is one reason why we are seeing, at least in the utility sector, the public utility commissions starting to incorporate externalities in the price of electricity. The state of New York started with a surcharge of 1.5 cents per kilowatt-hour to deal with these externalities.

I have not touched on the individual measures, but I am running out of time, so I will stop right there.

The Chair: I wonder if I can ask you if you would continue your presentation with a discussion with the committee of the economic analysis that accompanied the drafting and the economic approaches that are being recommended, particularly the phasing of capital costs and incentive proposals and so on.

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Mr Totten: The guts of our bill is what is called the least-cost energy planning process. This was pioneered by the Northwest Power Planning Council, which was mandated by Congress back in 1980 to rank all options for energy delivery in order of their cost-effectiveness. At that time, in 1980, the northwest region, which is the four northwest states, was planning on building 16,000 megawatts of coal and nuclear power plants. After going through this exercise, they found that the cost-effective potential for efficiency was such that you did not need those 16,000 megawatts of coal plants. The same thing

could be done for the whole US. In fact, this is one least-cost curve. It is a little complex, but basically it shows that a third of all the electricity delivered in the US could be saved through efficiency that is basically negative. That is to say, we would have such enormous capital savings that we would save about \$150 billion per year on our energy bills while preventing at least a third, if not a half to two thirds, of the electricity we use and a comparable amount of oil.

Obviously with continued economic growth we are going to see a steady increase in energy consumption, but as that stock grows, you obviously can put in place the most efficient appliances, which are going to get you typically two thirds or more savings. The major guts of the bill are to get this planning process in place at the national level. It is now being either implemented or undertaken in some 35 state public utility commissions. From our electricity sector perspective, they are far out in front of the federal government.

You probably have heard of the collaborative process in New England. I brought a copy for you. I do not know whether your utility sector is predominantly public or private stockholder, but this is working with the private stockholder companies in New England, all the major New England utilities. They expect this program to probably eliminate the need for new power plants in New England through the turn of the century. It basically had to change the incentive process, because we were finding that even if these efficiency potentials are identified—and they are typically being identified as five times cheaper than building new power plants—the incentives are to build more power plants because that is the way the utilities are rewarded: The more you sell, the better the cash earnings are.

I have brought the report that was prepared by the utility commissioners, Profits and Progress Through Least-Cost Planning. This was through a program that Claudine got through Congress. It shows that capturing more than 10 per cent of the efficiency savings will severely erode the utilities' cash earnings. That is why most utilities do not like doing least-cost planning.

What the the collaborative process has done is give a triple return on investment to the utilities. First of all, it allows them to rate-base the program costs for giving rebates to consumers. Second, it recoups their lost earnings, because as people use less, the revenues go down but they still have the fixed costs they have to amortize. So they get those returns on cash earnings. Then it gives them a fraction of the savings as an incentive to capture as much of the potential as possible. So it is a triple return. It is probably state of the art in the world today on what a utility can do. Boy, they are going aggressively.

John Rowe, who did the introduction to this report, and who is the head of the New England Electric System, made a rather telling remark. He said, "You've finally put the cheese in front of the rat," in terms of getting the incentives in place. I thought it was a rather derogatory remark to make about his own profession, but he was referring to the incentives having to be in place if you are going to get this right.

Mrs Grier: What has that done to rates then?

Mr Totten: They go up slower than they otherwise would have gone if they had just raised the rates for building new power plants. This is a major distinction you have to make. You have to decouple utilities. Just as they have to be less concerned with their revenues going up, if they want their cash earnings to remain or go up, customers have to look at their bills going down even if their rates are going up. That is the main difference. That is what the breakthrough was in this program, to

show that you can get lower bills even with higher rates, just as utilities could get higher cash earnings with lower revenues. That is a profound program. The people who put this together now have been invited to the World Bank to talk about the restructuring of utilities around the world.

The Chair: Some of the members of the committee who sat when we were reviewing the Ontario Hydro report met with people who were involved in the preparation of this program. It might be useful, I think, for the committee to invite them back to come before us.

Mrs Grier: Nobody paid any attention the last time.

Mr Totten: I might mention one renewable that I think is not mentioned in the task force report which I think has as profound an opportunity in Canada as it does in the United States. It is the advanced gas turbine. These were developed through our air force research and development program; 10 years and \$5 billion, and we are still spending about \$500 million a year refining them. They are the next wave of technology replacing the steam turbine, and in fact they are superior to the combined-cycle power plant which most of the utilities have been looking at and which is what the report of the task force focused on.

These turbines not only have a very high efficiency, above the combined-cycle, but you can put a gasifier on the front end, which was developed through our clean-coal program, and use tree crops or crop residues, which are gasified, and run them through the turbine. We have had testimony in Congress that if we were just to plant trees on 50 million hectares of eroded classified lands, we could displace all coal currently burned by utilities using this technology. It is one of the intriguing technologies that the World Bank is getting very serious about.

Mr Cureatz: They say the coal miner is the heart of the tree movement.

Mr Totten: Yes, very seriously. In west Virginia and Illinois, coal miners are planting these trees. It makes very good sense. In Sweden, they estimate they can back out 80 per cent of the nuclear power plants with this technology, which they are obviously required to do between 1995 and 2010. Nuclear provides half of their country's electricity, and this is estimated about 80 per cent through their timber logging industry. I highly recommend that.

That, totally absent from the task force report, really biases, because the capital cost on this is half the coal plant, two thirds less than a nuclear power plant.

The Chair: We have a number of questioners on the list. Can I move into that phase now, because we are closing in on our time.

Mr D. R. Cooke: This has been a very interesting presentation and I compliment you for the work your congresswoman is doing. Is she a Democrat or a Republican?

Mr Totten: She is a Republican. Sometimes Mr Bush tries to overcome Mr Sununu's opposition to many of these proposals.

Mr D. R. Cooke: The problem with carbon dioxide emissions, for instance, is largely a problem that has been created in the First World, by those of us who are developed countries. We have heard evidence to the effect that perhaps Canadians do more per capita than anyone else, and I am sure you guys are pretty close to us.

Mr Totten: We are above you.

Mr D. R. Cooke: Oh, are you?

Mr Totten: You are about four tonnes per capita per year; we are five. I did not put up Sweden's graph, but they see a high-efficiency biomass strategy getting 35 per cent reduction in CO₂ in their electricity sector, and they are less than two tonnes per capita right now, so there is enormous potential.

Mr D. R. Cooke: But the future problem would seem to be coming from developing countries, from presently under-developed countries and developing countries. I think we saw some evidence of that this morning where we noted that there will be great deal of coal mining in China. We noticed the growth in cattle in Brazil as they are burning the biomasses, etc.

A witness yesterday suggested to us that one of the ways we can approach this, because we do not have a very good moral argument, having created the problems ourselves, to turn around now that we are developed and say to these countries, "You can't do anything, because, we're sorry, we didn't know what we were doing when we did it, but now we know"—I think the suggestion was made that we set examples to other countries, and at the same time we make available to them all of our research, all of our knowledge as fast as we get it so that other countries can utilize our knowledge and skip over some of the things that we went through in industrialization.

That seems to make eminent sense, yet for the last four years now your country has been arguing very strongly at the GATT negotiations that there be rules to protect intellectual property. I think our country has probably been passively acquiescing in that argument. It is an argument which, of course, benefits developed countries at the expense of the under-developed countries, which are attempting sometimes, I suppose, in the view of developed countries, to steal some of that information, or a copy of it.

Surely if we are going to set up some kind of an understanding with the underdeveloped countries, we are going to have to rid ourselves of this concept and stop our insistence that our intellectual property be protected, or else there is no way; no matter what we do, we are not really going to solve the problem.

Mr Totten: Absolutely. I strongly share your concern. I think a very vigorous research and development collaborative process, technology transfer, is something that Claudine has pushed for a decade in Congress.

Let me give you three lost opportunities, one in China. At the beginning of the 1980s, China had a saturation of 60 per cent in refrigerators and by the end of the decade it was up to two thirds saturation. As a result, they had to build over 13 major refrigeration factories. What did they do? They did not realize they could build refrigerators using half or less of the electricity at no extra capital cost. Instead, they just simply bought the castoff refrigerator factory technology from Japan; it was putting in its new state of the art. As a result, they now have to come back to the international finance committee for billions of dollars and build thousands of megawatts of coal plants to operate those inefficient refrigerators. That is a gross lost opportunity that could have been checked with a more rigorous least-cost planning process and technology transfer program.

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They are about to embark upon the same thing in Brazil. Over the next 10 to 15 years, Brazil wants to flood 20,000

square kilometres of rain forest to build over 50 large dams. The analysis by Brazilian and United States efficiency experts shows that at least two thirds of that could be met through the efficiency technology I talked about and it would have net savings of over \$30 billion for the national economy. Again, this is a lost opportunity that is being driven by an inadequate planning and tech transfer.

I see that where we have tens of billions of dollars going through the pipeline every year, the very first thing is just to do rigorous planning. We could leverage this several-fold just by doing better planning. But you are absolutely right: We have to share.

I must say, though, that much of the technology that we have to offer in industrial efficiency, apart from the motors and so on, is not nearly state of the art. At least in our country, where we have got old industrial factories that have not stayed in the R and D phase, it really leaves us to the technological forefront, so we have to be careful. We do not want to just transfer technologies that are not near the forefront of what could be used.

But clearly on the commercial, and even on the residential, many of the tropic areas—I go to the Caribbean every year, and have for 10 years—are just importing temperate climate building technologies, refusing to use their indigenous landscaping that gives natural air-conditioning and a variety of passive cooling methods so that, even in 115-degree weather, you can maintain indoor residences at 70 degrees. So we have to be very careful in the technology transfer that we are not imposing technologies that are totally outmoded or extraneous for their particular circumstances.

Mr D. R. Cooke: The point of my question, though, is that your government seems to be going in the other direction in so far as its debate is concerned at the GATT.

Mr Totten: I know there are many members who disagree with our government's policies.

Mr D. R. Cooke: Is there anything in the bill that directs the government, because the United States Trade Representative would suggest there is a protection of Congress there that is forcing their hand?

Mr Totten: Yes. In the bill, part of the biggest thing for developing countries is for the US to look at forgiving up to half of all debt owed to it, for conservation, from debt for conservation, for ecologically sustainable development, the idea being that we do not just want to give them money to build large dams or to take out virgin rain forest to put in monoculture pine species for aluminum factories. We do want to have some provisions on there, but we recognize that these debt-strapped countries are liquidating their natural assets to meet debt payments.

It was mentioned earlier about tree planting. I brought a paper along that shows we are losing about eight million hectares per year in the rain forest. Each time you burn a hectare, you have released about 150 tonnes of the biomass. To replant, to get the same carbon, we would have to plant 800 million hectares to recapture that lost biomass. So tree planting schemes, after losing it, are clearly one of the most deleterious facts or most misguided policies we could do. We need to get the preservation in place front-end, and that is part of the biggest provision in our bill, to help preservation, which will have the biggest bang for the buck.

You see, the bill does not cover everything, even though it has over 100 bills in it, and many of those are macroeconomic

trade issues. Tax policies: Apart from the gas-guzzler tax for cars, we did not really get into the whole tax structure thing.

Mr D. R. Cooke: So that is a very positive thing to be suggesting, a forgiveness-of-loan concept. Is that being well received?

Mr Totten: It is being talked about a lot. We do have an interparliamentarian conference coming up right after Earth Day in the US; 65 nations have been invited. That is going to be on the agenda.

Mr Cureatz: You have said so much and you spoke so quickly, and I get nervous about people speaking quickly, because I do that in the Legislature and usually when I do, I do not know what I am saying. I will make that admission. However, I feel comfortable that you certainly have a good grasp of the topic.

Mr Totten: It is usually a two-hour talk. I knew I was going to have to compress a lot.

Mr Cureatz: Yes. There are so many questions to ask.

Mr Callahan: Sam tries to expand his one-minute talk to two hours.

Mr Cureatz: Without using up any more time, one crucial question that I have in terms of your emphasis, and certainly my New Democratic Party colleagues, and Brian Charlton, have always emphasized this, is in terms of energy efficiency and savings on the huge requirements in capital cost outlays for plants, like a nuclear generating station.

Where is the crossover line between getting all of the various aspects you have spoken about in here and being able to make those savings, and yet still having to face, whatever that short term is, 1 to 10 years, the continuing economic growth and requirement structures? You did not touch on that. Probably somewhere there is something on it. Where is the happy—is it seven years from now, if it all started to happen tomorrow?

Mr Totten: The technologies are out there to maintain a moderate, three per cent per year rate of improvement, so we are not talking about accelerated rollover, although it does make economic sense in some cases, but we are talking about, just as the stock rolls over and as new buildings are being built and new factories put up, you always want to make the best of that so it is cost-effective, which was not being done probably 80 to 90 per cent of the time. So that is the first thing and that will continue for the next 50 years.

At the same time, we have so many supply options. There is no lack of supply options. What we are talking about is the problem of which ones are the most ecologically sustainable. Here is our national laboratory estimate of increased solar technologies and renewables over the next 40 years. While currently we get about 10 per cent of our country's total energy from renewables, the business-as-usual scenario, which is no incentives and maintaining our R and D program at about \$100 million a year, is only going to get us a doubling. But if we double our commitment to R and D, we could get about a fivefold increase over the next 40 years that is ecologically sustainable. If we put on a two cent per kilowatt-hour tax on utilities and about \$2 per million BTUs on oil, we get about a fourfold increase.

Mr Cureatz: I guess what you are saying then is that it is dependent on the commitment that is made by the society.

Mr Totten: Absolutely. R and D commitment is absolutely imperative. We have basically reduced our R and D commitment in the US by 75 per cent on conservation and 90 per cent on renewables this past decade. That has got to turn around or by the turn of the century we are basically going to see us back into the same old argument of building fossil-powered plants because we have no other alternatives.

In the US, at least—I do not know what it is in Canada—two thirds of the public is against new nuclear power plants, so I do not see that as a viable option, even though the US government continues to spend five times more on promoting nuclear as it does in combined conservation and renewables, just the opposite of what the public polls want. That is why we are so vigorous on least-cost planning and including the externalities that can be quantified and then a vigorous R and D commitment. Those three things, we think, will put us in good stead for the next 20 to 30 years.

Mr McGuigan: Mr Totten, I am interested in those fluorescent lights that you have as an example. I equipped my house; I have not quite finished it, but I have a number of them in my house. In Canada they retail for about \$36 each.

Mr Totten: Good Lord. You need some utility rebate programs. Let me tell you what they are doing in Maine, or Taunton, Massachusetts. It gives the bulb away free and then it pays it off on the utility bill, but at a long enough rate that you never see the utility bill go up. Because they are able to do that, they get mass volume purchasing. They purchase some for about \$10 a piece. Southern California Edison buys 100,000 at a time. They get them for about \$6 a piece.

You are right. A consumer is not going to pay \$36. In the US they retail between \$15 and \$22 for an individual customer, and apart from enthusiastic advocates like myself—half my house has these bulbs; I have not changed a bulb in about two and a half years—the consumer is not going to go out and buy these.

They only take a couple of dollars to manufacture, and all the light companies are operating 24-hour-a-day factories to keep up with demand. It is in the commercial sector that they have a premium, because you have got your maintenance man going out on a ladder, and in the US Congress it is two maintenance men on a ladder, who are going down the hallway changing these incandescents 10 times more frequently. You have got yourself \$25 in savings before you even start looking at the electricity savings, so you have net savings of \$30 to \$50, depending on the utility rate. Obviously they are going to mark the price up in an order of magnitude to capture what profits they can.

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They estimate that once their volume exceeds a certain level, the price will drop below \$5 and you are going to see them in hardware stores, in Sears and just about anywhere. But utilities can advance this dual rebate program. Central Maine Power sells them to the Lions Club for \$2 apiece and the Lions Club goes door to door selling them for \$3 apiece. It makes money for the Lions Club and Central Maine goes to the utility and says, "We had to buy these at \$14 apiece so we want it rate-based to make up the difference." That works out to half a cent per kilowatt-hour delivered electricity. The consumer discount rates are at least, in order of magnitude, rougher than utility discount rates, and somehow the societal savings go into the tens of billions of dollars as a result of that.

I also want to point out another technology. You can get these in floodlamps. Kentucky Fried Chicken put tens of thousands of these in its chandeliers. There are just so many different ways of using these things that are so delightful.

Mr McGuigan: Just for the committee's sake, Ontario Hydro has a program with the United Co-operatives of Ontario. I am not sure of the details but there is somewhat of a rebate program. In my own case, I have gone to a local distributor because of my interest, and I guess I am the only person in the county who buys it. He gives me a 40 per cent discount.

Mr Grier: If they did as much promotion on that as they have done on their plans for the future, we would all buy them.

Mr McGuigan: I went to my local co-op and they did not have any in stock. Nevertheless, if any members of the committee here are interested, I could get you a 40 per cent discount on them.

Mr Callahan: Our Hydro gave us a presentation and showed us some of those fluorescents. They went out to business, particularly a bar, where they gave them a light to try to convince them that it would be a good idea to outfit the whole place. They went away and came back a week later and the guy said: "It's terrible. It doesn't create the ambience that is necessary for this bar."

Mr Totten: That says something about the utility manager, the inadequacy of his searching the market for the range of lighting quality. You can go from very cool to very warm. They cover the whole colour-rendering index scheme. Also, it may have been too little light for the situation. These run from five watts to 28 watts.

Mr Callahan: It was too much apparently; they liked dark bars.

Mr Totten: Yes. This is a little five-watt.

Mr Callahan: That was what he had.

Mr Totten: It may have looked like this; these also can come in 32 watts.

Mr Callahan: No, it was that wattage. I remember it.

Mr Totten: He could have put one of these on it and it diffuses it. There are about 25 different types of diffusers now. These are used in restaurants and hotels all over the United States. It has been used by Denny's. All the major chains now use these because they are reaping hundreds of thousands of dollars in savings.

What you are saying is so typical. I go and talk to a lot of the utility conventions and this story comes up over and over again. It is basically that they are just not aware of how rapidly we have seen so many different technologies to accommodate virtually any condition that is required. Philips now holds an annual contest for architects to come up with the best designs. Any possible conceivable building arrangement has got these very beautiful designs. So he is just not doing his research.

Mr Callahan: They also had a shower fixture. That is it.

Mr Totten: This is the best on the market right now, state of the art, gets you 75 per cent savings, but unlike the earlier one, which gave a kind of needle effect that a lot of people did not like, this gives a nice, vigorous, full shower. Did he have problems with that too?

Mr Callahan: No. Actually, he gave it to me as a giveaway.

Mr Cureatz: Did it work?

Mr Callahan: It is only worth about \$14; it is not a conflict.

Interjection: So long as you reported it.

Mr Callahan: It is interesting because I have four sons, and when they are away at university we actually save money on our gas bill because they are not taking as many showers as they normally do.

Mr Totten: Yes. My water slides do not show it, but you can get two thirds to 80 per cent in savings on showers and toilets, and just the energy savings will repay the entire investment cost of that device, a major savings. In our state, we have been able to prevent the destruction of one of the most beautiful wildlife habitats in Rhode Island. It provides more water. Just by these efficiency technologies, we showed that for 90 per cent less cost we could provide virtually all the same energy supply through efficiency improvements.

Mr McGuigan: Philips is the brand that is available here, and on the outside of the package it says, "Not to be used outdoors." It also says not below a certain temperature.

Mr Totten: Right.

Mr McGuigan: I have been using them outside with no adverse effects.

Mr Totten: Actually, there are new models on the market that can go lower and lower. I know that for the climate around here you certainly ought to be able to use them outdoors. You basically have to make that as a special request. Around the Rocky Mountains, where I visited, they used them outdoors. You do get reduced lumen output, but that is about it; it should not hurt the bulb.

Mr McGuigan: I have only been using them for less than a year but so far they are all right.

Mr Totten: Yes, it is slower to come on and it does not quite give off the brightness.

The Chair: He is not likely to be electrocuted.

Mr Totten: Oh no.

Mr Charlton: I will just be very brief because I think we are running a bit over. You talked a little bit about some of the things that are happening in New England, and I am aware of one specific program, between Central Maine and a company that I think is called Cesco Inc.

Mr Totten: That is probably the energy service company.

Mr Charlton: That is right. The company has contracted with the utility essentially to pay 100 per cent of the capital costs of efficiency improvements, I think, in something around 10,000 homes.

Mr Totten: Yes, it is a bidding process that Central Maine is trying to use and many other utilities in the country are looking at. They are opening up to demand-side bidding as well as supply-side bidding. The idea is that if you can go into residences and put in equipment, you basically bid up the utility. You can deliver that in a three-year payback and you can actually implement it for a two-year payback. Then you obviously are making your profit and the utility gets delivered the energy

services where I think the bidding has come in at less two cents a kilowatt-hour and way below.

Mr Charlton: Those are the numbers I have heard, yes. The reason I raised it is that I know there are a number of similar programs scattered throughout the United States, and I do not want you to spend your time trying to describe them for us, but if you could perhaps, after you return home, supply us with a list of utilities that you know are involved.

Mr Totten: It is moving so rapidly. What I recently finished was a book on a whole range of energy options that the United States could take, many of which are obviously applicable to the provinces, and it is going to be coming out next month by the National Centre for Policy Alternatives. It was commissioned by a committee of state chairmen of environment and energy committees in the United States and it took me about five months to compile. It is the best resource that is available in the United States. Is that what you are asking for?

Mr Charlton: Have you got that?

Mr Totten: I will be sure to send a copy of it.

Mr Pollock: I would just like to know, as far as fuel-injection cars compared to carburetors are concerned, is there a major saving?

Mr Totten: That is one of the key technologies for improving fuel efficiency, getting a better burn. I believe it was fuel injection that was one of the technologies on the Toyota AXV, which got up to 98 miles per gallon average.

Mr Pollock: I see. What are we talking about in percentages over a normal-sized car with a fuel injection compared to a—

Mr Totten: That I do not know, but there is a book out that would give you that answer. It is our book, which we refer to most often, called *The New Oil Crisis and Fuel Economy Technologies*, written by Deborah Bleviss, who is probably one of the foremost US experts on auto efficiency. This book came out the year before last after she went around and talked to every major car company and said, "What technologies do you have in the pipeline for raising fuel efficiency?" That was one that she discussed in detail. It is published by Quorum Press. It is referenced in this document that I will send you.

Mr Kerrio: We raised a question yesterday about the initiatives by the federal government on the corporate average fuel economy program. Is that now totally lost? Is that in limbo, in the sense that it was an initiative by the US federal government? Ford and General Motors failed miserably to come up to the standards; I think Chrysler did.

Mr Totten: Our estimate is that it saved the American consumer \$180 billion net over the cost of improving the fuel efficiency in cars through 1986. I will tell you what happened

recently. As part of the Clean Air Act there was a provision in there to set a tailpipe standard for CO₂ emissions which, because CO₂ and fuel economy track very tightly, would have raised fuel economy standards to 40 miles per gallon by the end of the decade. It was, just last week, stripped out by the compromise between the administration and the majority leader. It was a real sad event. We were really seeing that as our first big step to tell the world we are doing something.

Senator Bryan of Nevada and Senator Kerry of Massachusetts will offer the amendment to put that back on when it goes to the floor of the Senate this week. On the House side Claudine is going to offer the amendment, if it is allowed, because there may be a very tight rule which does not allow us to offer amendments, but she is going to offer it on the House side. That is step 1. Step 2: Senator Bryan of Nevada has been our vigorous advocate on the Senate side to get fuel economy standards reported out, and if it does not get into the Clean Air Act, he has already held hearings and he will try to move legislation some time this year for improving fuel economy standards.

Two thirds of the American public support this; in fact, by a four-to-one margin they support higher fuel economy standards, but we have a chairman in the House, Mr Dingell from Detroit, who has stopped even hearings from being held this past decade, let alone consideration of the bill. It has just been a very frustrating experience, because the administration—both Reagan and Bush—is very anti-fuel-economy standards.

Mr Kerrio: It is one of the areas where we are totally reliant on the initiatives taken in the USA in the design of automobiles that are built here.

Mr Totten: It is really strange. The administration and the Congress are really excited about methanol fuels and alternative fuels. None of those schemes make economic sense unless you get vehicles over 40 miles per gallon. What did we do last year? We gave an incentive to the auto companies to make flexible-fuel cars; we rolled back the fuel economy standards, just the opposite of what we should have done.

The Chair: Thank you very much, Mr Totten. I know that the committee has found your presentation extremely interesting and important. Some of them are hoping they will be able to join you for lunch so that they can keep on talking.

This afternoon we will start hearings at two o'clock with Dr Kirk Dawson and Dr Cuthbert. I am asking that members please try to be here on time, at two. Mr Brown will be chairing and I would appreciate that courtesy extended to him.

Additionally, tomorrow morning the hearings will start at 10 o'clock. This afternoon, just for your information, Dr Brooks has been unable to join us, due to a death in the family. He will reschedule his appearance before us at a later time.

The committee recessed at 1216.

AFTERNOON SITTING

The committee resumed at 1411.

ENVIRONMENT CANADA

The Vice-Chair: Good afternoon. This afternoon we are pleased to have with us, from the Atmospheric Environment Service, Canadian Climate Centre, Environment Canada, Dr Kirk Dawson. Dr Dawson received a PhD in solid state physics

at the University of Reading, England, in 1968. Since that time he has been employed in numerous positions, most of which dealt in some way with the environment. Dr Dawson has been the director of the computing and communications services branch of the Atmospheric Environment Service of Environment Canada. Following that, he was appointed the regional director general of the Pacific and Yukon regions of the AES.

Presently, Dr Dawson is the director general of the Canadian Climate Centre of the AES. Welcome, Dr Dawson.

Dr Dawson: Thank you very much. I have a presentation on essentially the science, the impacts, of climatic change, and what I have tried to do is give some focus of those impacts on Canada as we know it at this point. I will then briefly lead into where the international agenda is and where the domestic agenda is, and then a colleague will follow and talk more specifically about the Great Lakes, which is an area of great interest to you, I think.

Climate change is an issue that is relatively new. It has been with us as an issue probably only for the last five years. It is, however, one of a series of atmospheric issues. If you look at the atmospheric issues on a global scale and on a time scale, what you have are the local issues dealing with concerns that are of hours or days, with severe weather emergencies and with local air quality concerns. Those are the issues that we were concerned with probably 40 or 50 years ago. Work has occurred to resolve many of those issues, but as we did, we realized that there were more, let's call it, transboundary issues that were of concern, and that is where we got into the concerns of acid rain, we got into the concerns dealing with toxics in the Great Lakes as a result of movements through the atmosphere.

As we learned more about those, we came to the realization that there were longer time-scale processes at work as a result of human intervention with the atmosphere. The first of these was the ozone depletion problems as a result of chlorofluorocarbons being released by industrial use and by use in the home. We came to realize that these releases were causing problems with the ozone layer. Those, to a degree, are now being managed, but as we have dealt with those, we have now come to the recognition of the climate change issue, the issue of those other atmospheric pollutants and what they are doing over the long term to our climate.

Climate change, however, is not a simple process. There are many causes of climatic change. You have natural causes and you have man-made causes. The natural causes, resulting from orbital changes of the earth around the sun, are, in fact, going to cause cooling of the climatic system over a period of time. What I have tried to do here is give you a sense of the order of magnitude and the rate at which that change will occur. The orbital change: You are likely to see changes of about 0.1 degree centigrade over a period of about 100 years. You are going to see effects of volcanoes. A massive volcanic eruption can give you anything up to 0.4 degree over one to two years. This would only be a significant effect if you had a major volcanic eruption occurring once every six months. Are volcanic eruptions real? Do they affect climate? Very definitely. We had a volcanic eruption in the year 1816 that resulted in Canada having a year with no summer. The crops failed in Canada that year. The ice barely left the Great Lakes. We have good records of that event. So volcanoes do have an effect, and it is a cooling effect.

We also have sunspot oscillations. Those give rise to effectively a cyclical change in the amount of radiation coming in to the earth and therefore into the climatic system. That is giving you a change of about, plus or minus, 0.2 degrees on about an 11-year cycle.

All of those effects are going on at the same time. At the same time, we have the man-made effect, the greenhouse effect. This is believed to be about one and a half degrees to five degrees and occurring at the time frame of a doubling of the concentration of CO₂ in something like 50 to 100 years.

What I wanted to do was contrast the man-made causes with the natural causes, and we have all of those things going on simultaneously. You see a lot of debate in the literature about one scientist saying: "The greenhouse effect. Don't pay any attention to that. Pay attention to changes in the orbit; pay attention to changes in the solar constant." There is a scientific debate going on as to the relative importance of each one of these, but what is very clear is that there is really no scientific debate on the greenhouse effect. The greenhouse effect, put very simply, has incoming radiation from the sun, a certain amount being reflected, the majority going through and heating up the earth, a certain amount then being reradiated at a different wavelength, being absorbed by the greenhouse gases and thus heating the earth. That effect is about 30 degrees for the earth, about five degrees for Mars, and about 500 degrees for the planet Venus. There is no real debate about the existence of a greenhouse effect. What there is a debate about is how much that effect will change as you change the concentration of the greenhouse gases. We could go anything from, let's call it, the Mars level to the Venus level, depending on what we do with the concentration of those gases.

What are the gases involved? You have probably heard this already, but let me refresh your memory. Carbon dioxide represents effectively 50 per cent of the greenhouse effect at this point; methane, approximately 18 per cent—and I think you heard more about that this morning; nitrous oxide, six per cent; the infamous chlorofluorocarbons, about 14 per cent; and others such as ozone at various levels in the atmosphere, represent another 13 per cent.

We are at work already on controlling CFCs. That is a very important activity because concentrations of CFCs in the atmosphere are increasing at this point at the rate of about six per cent per annum. If we had not got the Montreal protocol, a similar graph done in a decade's time would have shown that CFCs were the dominant cause of the greenhouse effect at that point in time. Therefore, the introduction of the Montreal protocol was a very important move, not just for the ozone issue but also as it relates to climatic warming. What is even more important is that the Montreal protocol be, in fact, strengthened further, as is currently planned.

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Have we seen any correlation on the earth between concentrations of CO₂ and temperature? The answer is yes. If you look back over the history of the earth, if you drill down through the ice cores in Antarctica, then you can obtain information on the concentrations of the gases that were existing in the atmosphere at that time, and you can also get information on temperature. The concentration on this graph shows in red the concentration of CO₂ in the atmosphere, with green showing the concentration of the temperature at that point in time.

Mr Callahan: Can we ask a question at this time?

Dr Dawson: Certainly, go ahead with clarification.

Mr Callahan: This is interesting. This was raised by a question earlier in a similar graph. Some 160,000 years ago, the peak was quite high in terms of greenhouse effect or heating up, and yet you did not have any of this man-made CO₂. Is there any way of knowing what that was from? The people who were before us suggested that maybe it was because of the fact that the earth was tremendously green, there was a lot of lush plant life, large animals dying, I guess, and providing the methane to enhance the greenhouse effect through methane as opposed to through CO₂.

Dr Dawson: You can explain about 95 per cent of that variability that you see on there in terms of temperature by two factors: a greenhouse effect and changes in the orbit of the earth around the sun.

Mr Callahan: Yes, but that was the second part I was going to ask you. The changes in the orbit around the sun seemed to raise the temperature in such a minuscule way that I wonder how the ice age ever happened.

Dr Dawson: What you get is the greenhouse effect magnifying the other effects. As you get, you could say, less heat coming in, then you get less heat absorbed and you get less vegetation. It goes on in that feedback. That is a reverse process. What you see there is a transition between 200 parts per million of CO₂ and 280 parts per million.

What I am going to show you on the next overhead is that we have taken the atmosphere well beyond that. What we have now is, we have taken the concentration from that previous peak, the previous highest level ever, up to about 350 parts per million. We are now 25 per cent higher than at any time over the last 160,000 years. We have taken the earth to an atmosphere that is now very different from any time over the last 200,000 years. What is more, we are expecting it to continue to go.

What I would like to do, if I could now, is talk a little bit about the simulations that have been carried out using what is called general circulation models. These models use the basic physics of the solar system, they use basic thermodynamics, to simulate what the climate should be and they do it from first principles. You do not have to give those models the current weather or anything like that. You simply tell them the amount of energy coming in, the concentration of gases, the type of topography of the earth, and they calculate what the weather and the climate system should be. There are six models that have been run to date; the top one is a model run by Canada. It was completed this last September or October. It is compared there against four American models and one from the United Kingdom.

What we have here is a global surface warming, on average. From the Canadian model, we are saying it is 3.5 degrees centigrade on average for a doubling of CO₂. That compares with other models, which range from 2.8 degrees to 5.2 degrees. That is a global average. It does not relate to what Canada would experience. What I want to do here is show you what, we are calculating, is likely to be experienced by the northern hemisphere.

If you look at the northern hemisphere, you have here North America, over here you have Europe and then you have the Union of Soviet Socialist Republics. The changes from a doubling of CO₂ would show a warming for Canada of about four degrees. For the Prairies you would see something like six degrees. Up in the Arctic here, in the Arctic Ocean, you would experience something like eight degrees. For the Seychelles over in Africa you would see something like four degrees. So the problems that Africa is experiencing in terms of droughts and what have you are going to be much worse under this type of environment, but so are ours in terms of the Prairies.

When you look also at the USSR, you will see that it experiences very substantial warming. As a result, the USSR at this point, for example, expresses the view that it would become the bread basket of the world under this type of environment. They would have a much more pleasant environment in which to grow crops and things like that, things that they cannot currently do. One of the problems with this type of scenario is

that there is the perception of winners and losers. That is something we will have to deal with in international discussions.

What I would like to try to do now is to use those models to give that look ahead as to what may or may not be happening. What I would like to do is give you two scenarios. We have a scenario in red, which is the concept of a business-as-usual scenario; ie, there are no controls being placed on CO₂, there is nothing being done to methane and CFCs are controlled only at the Montreal protocol level. That is what one would call business as usual.

Based on that, you would effectively see a doubling of the concentration of CO₂ early in the next century. You would also see it continuing. This is one of the difficulties with the previous display of models. We talk about three degrees being the result of a doubling of CO₂. What we do not go on to say is that it will continue to grow as the concentration of greenhouse gases continues to grow.

The yellow line that you see here is, to a degree, a significant intervention by governments to control CFCs fully, eliminate them, to control aggressively methane by acting, for example, on landfills, by acting on transmission systems, controlling nitrous oxide by controlling automobile emissions and by controlling CO₂ very aggressively. That is what you would call the maximum intervention. Even with that, you will see a doubling of CO₂ late in the next century, probably around 2060 or 2070, some time around that. What one is doing by intervention is simply delaying the time at which the doubling will occur.

If you use those two scenarios and calculate what temperature changes are likely to be, you get something like this. Unfortunately, in this highly illuminated room you cannot see the history, you cannot see the last 100 years where we have, from here to the present time, the current temperature trends. You are going to hear more about that from Philip Jones from the University of East Anglia. He will talk to you at some length. I think, about the work they have done on analysing those trends, so I will not go into that here.

What I can say is that over the last 100 years there has been a warming of about 0.5 degree, half a degree of warming. Six of the last 10 years have been the warmest years the world has experienced in the last 100. That cannot be taken as proof of a greenhouse effect. It is consistent with it, but it is not a proof of it.

What we have then done is said, "Extrapolate further into the future using those two previous scenarios." What you would see with the red curve is an increase of temperature at the rate of about 0.8 degree per decade, a very substantial warming, a rate that the world has never experienced. Even as we moved from an ice age to the present, for example, the rate of change was substantially less than that. This is a rate of change to which, for example, forestry could not adapt. The trees would be growing in a climate that they were ill-prepared for. So this is a rate of change, and I would like to emphasize the rate of change here, that is very difficult.

The lower band is the result that you would get from that maximum intervention. You would be slowing things down very dramatically in terms of the amount of warming. You would still be experiencing warming but at a rate of probably less than 0.1 degree per decade. The most likely scenario is probably somewhere in between.

I think that the challenge for policymakers is that it would be undesirable to go up the red line, quite undesirable to follow that curve. At the same time, it would probably be economically undesirable to follow the yellow curve. Therefore, we have to

be somewhere in between. The most likely scenario says that about 0.3 degree centigrade would result from government actions. It is still a significant warming and still a significant rate of warming.

I have concentrated on global temperatures. I would like to just do the same thing on future sea levels. This is an issue that is not of the same level of concern for Canada.

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Mr Kerrio: That issue is a very important one, because there was some major work done by Canadian scientists about the release of tremendous amounts of methane by the warming of the sea in the Bermuda Triangle.

Dr Dawson: That is possible.

Mr Kerrio: And the warming in the sea, because it has been held in suspension in cooler waters in the deep, is quite an interesting phenomenon that he is describing, the release of tremendous amounts of methane from the ocean floor by the warming.

Dr Dawson: This is simply the level of the sea going up as you warm it. This would be a significant concern, for example, for the Maldives. The maximum height of the Maldives is only three metres, I think, above sea level. It would be a significant problem for Bangladesh. Bangladesh has 50 per cent of its population living within one metre of the current sea level. It would be a significant problem for Egypt, where the Nile delta would be inundated. So while it is not a significant problem for Canada, there are many countries around the world which say, "Don't look at the temperature problems"; they look at what the sea level is going to do.

Here you see the same three scenarios. You see the business-as-usual scenario, which shows a rate of about 20 centimetres per decade. You see that in fact, if governments intervened aggressively, we would actually reduce sea levels substantially by all of one centimetre a decade. The most likely scenario sees it increasing at about five centimetres a decade.

If we intervene, if we slow the rate down, it gives time for adaptation. I think this is one of the keys I want to come to later in the presentation, that policy response must be based not simply on limitation but on using limitation to allow one to adapt to the changes to which we are already committed.

Have we done any studies on the impacts on Canada? The answer is yes, we have done a large number of studies over the last five years looking at the socioeconomic implications of some of those changes. If they took place, what would it mean for Canada? What we have tried to do here is to give you a colour coding. Green is a positive effect, red is a negative effect and magenta is something in between. What you get out of this is that there are pluses and minuses.

Mr Callahan: Shipping hazards are a positive effect?

Dr Dawson: Yes, there are reduced shipping hazards in the north. There is a reduction in shipping hazards in the Arctic as a result of this. The Arctic actually stays open in certain areas under this type of scenario; therefore you get a reduction in the shipping hazards in the north.

You get farming being introduced into the Peace River Valley of British Columbia, an area where you cannot currently do agriculture because of the very short growing season. With this type of climate you would see agriculture moving into that area. You would see improved crop growths in the Prairies because of the extra CO₂, providing you could provide the water. There

is a significant concern that the water availability on the Prairies would substantially decrease under these types of environment.

We would see a reduction here in heating costs, a significant reduction in heating costs. There would be some positive changes to parts of the agriculture in Ontario. There would be some ability to do improved agriculture on the Canadian Shield, if you could find enough soil to do it on; the climate would be right but the soil types are not particularly conducive. You would see significant problems in terms of water demand in the Great Lakes basin. I think we will hear more of that following my presentation. We are going to see moisture stress problems in southern Ontario.

We will see problems associated with water levels, problems for hydro generation and for shipping. We will see problems with inundation on the two coasts. My suspicion is that this would not be a problem for the infrastructure; we can build the necessary diking systems to deal with that. What we would not be able to deal with is the provision of marshes for wildlife and things like that. There would be a significant problem on the west coast in terms of the impact on wildlife as it migrates north and south. We would have some problems with icebergs on the east coast as a result of that warming; we are going to see those icebergs coming down more substantially.

The key here is that, on balance, you could say the net effect for Canada would be about zero. But Canada under this climate would be very, very different, and what governments would have to do is manage a very substantial transition, a management of change, into a different world. Those are some of the impacts.

What are the sources? I am now going to concentrate on CO₂, as you have heard about methane, and I do not propose to talk about CFCs. In terms of CO₂ emissions, if you look at the global CO₂ emissions, one of the first things you notice is that there has been a movement towards a stabilization as a result of the oil price shocks of the early 1970s. If you look at the pink line there dealing with petroleum, you will see that the emissions coming from oil have been essentially constant since about 1973. That is a result of the significant price increase in oil that occurred back in the 1970s, which gave rise to significant improvements in efficiency in a number of countries. That unfortunately did not happen in Canada.

What you see is a significant steady growth in emissions from coal, natural gas and all sources. There is a movement towards stabilization but still an upward increase. Who is producing this?

I will show you the producers over two time scales. The red shows the emissions in 1950 and the blue shows emissions in 1985. What you see is the United States of America, the dominant emitter, back 30 years ago producing almost 50 per cent of the CO₂ into the atmosphere at that time. They have reduced substantially as a contributor, but not in net. They have become less significant because of the growth of the developing countries and growth of other countries. Other countries have grown in their emissions, not the Americans having gone down.

What you see there is Canada. It ranks about ninth. It produces currently only about two per cent of the world's CO₂ emissions, and what you really cannot see is that the level between 1950 and 1985 is essentially the same. Our emissions really have not changed dramatically.

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Mr Kerrio: That seems like a strange sort of comparison, with Canada and France being so close to the same percentage.

Dr Dawson: France is in a very advantageous position at this point. It made a major policy decision in the early 1970s, that it would go nuclear. It has a very heavy nuclear energy program, as a result of which its emissions of CO₂ are dropping dramatically and are projected to drop dramatically over the next decade.

Mr Kerrio: Japan has taken the same kind of initiative, the nuclear.

Dr Dawson: Japan's benefit predominantly comes, I believe, from a movement of much of its CO₂ production offshore. It is being, let's call it, energy-efficient at this point.

That was an interesting graph. However, the next one is the one that gives me the most difficulty whenever I go abroad, and that is the production of CO₂ on a per capita basis. Canada ranks fourth on this graph. If you do it for 1987, Canada ranks first. On a per capita basis, we produce more CO₂ than any other country in the world. We may represent only two per cent, but in terms of our individual contributions we rank very highly. This is why whenever Canada goes abroad to say, "Shouldn't we do something about this?" other countries turn around and go, "Shouldn't you take the first step, being so significant?"

There are reasons for our contributions, obviously. We are a cold climate. We have to heat. We have vast distances for transportation. We are a resource producer, which is a heavy energy demand. Those are all good rationalizations as to why we should be high on the list, but it still says that Canada, on an individual basis, is a significant producer.

Where does CO₂ come from within Canada? This is probably the policymaker's nightmare. When you look at where CO₂ comes from, it is coming from every sector of the economy. We are really not able to pick on one and say, "Okay, we can focus on that and have a significant effect." Transportation is 25 per cent, industry is 25 per cent and residential is 13 per cent. Energy conservation: The hydro companies, etc., are only 18 per cent, so if we focused in on them and got them to reduce by 50 per cent, we would still not have a major impact.

In order to have a significant impact on CO₂ emissions, you have to tackle the whole thing. What I call the policymaker's nightmare is having to deal with all sectors of the economy at the same time. Our record of achievement in dealing with this area is relatively good from an international perspective. Canada has been at the forefront dealing with the CFC issue. We were there at the forefront with the Vienna convention. We hosted the Montreal protocol, obviously, back in 1987 where the decisions to control CFCs were taken. We will play a major role in the London conference this coming year, where there will be a tightening of the Montreal protocol, and I suspect at that point it will change its name. We had the Toronto conference on the changing atmosphere here in 1988, where we had the articulation for the first time of a target for CO₂ reductions, that famous 20 per cent by the year 2005.

The setting of that target has in fact changed the discussions very substantially. Instead of discussing things in the abstract, we are now discussing things in the concrete. It has served the purpose as a challenge. Countries are now asking: "Could we do it? And if we could do it, what would it mean?" That debate is now going on within Canada. That conference, in terms of the 20 per cent, was a milestone event.

We had a meeting this last year in Ottawa dealing with the legal framework. How would we come to grips with this on an international scale? Some ideas on a framework convention on climate change were developed at that meeting.

We have participated in a number of meetings on ozone. The Prime Minister of Canada was involved in signing The Hague declaration which established some basic directions on this issue. We have been very active in a thing called the inter-governmental panel on climate change. This is where 43 countries are now trying to agree on the state of the science, on the impacts of a changed climate and what some of the policy responses might be.

The record of achievement, domestically, looks somewhat different. We have a federal-provincial energy ministers' task force at work and the province of Ontario produced a discussion paper just this last week as part of what you could call the ongoing dialogue. We have some regulations on CFCs. We have some regulations on controlling NO_x but that is dealing only with a six per cent issue, and we have a federal interdepartmental co-ordinating committee.

Mrs Grier: And our per capita production is going up.

Dr Dawson: Yes. There is the need for policy discussion.

Mrs Grier: We have lots of discussion; they just have not—

Dr Dawson: International. The policy discussion domestically has not proceeded at the same rate.

Mrs Grier: Internationally, it will come down?

Dr Dawson: No.

Mrs Grier: So the discussion has not produced much there either.

Dr Dawson: But the international discussion, I believe, will produce a convention of climate changes, probably in 1992.

I would like to now basically come to a summarization. What I would like to try to give you is a feel for the state of uncertainty. There is a lot of scientific debate; there are a lot of interesting articles in the media. I am sure many of you have read the Forbes article; there has been a Marshall report; there have been a number of reports which say: "Do not pay any attention to this issue. It will go away. It is not important."

I would like to try to give you a feel for where our certainty is, where our confidence is. In terms of the trends and changes in the composition of the atmosphere, there is no doubt. We are very confident that we know the state of the atmosphere and we know the trends in composition. That is not subject to any real debate. CO₂ is increasing at about a per cent per annum. We know where it is coming from, we know where it is going; no real debate there.

We have a good feel for the—let me call it the causes of the changing atmosphere. We know where the sources are. We have a good handle on what is producing CO₂. It is not hard to find the sources. We have that fairly well in hand.

We have a reasonable degree of confidence in the magnitude of global warming. It is 3.5 degrees plus or minus 1.5. There really is not a great deal of debate on that. And that is for a doubling of CO₂.

We have less confidence in the regional distribution of that warming. That regional distribution, that graph I showed you, is the state of the science, and there is scientific debate about that.

In terms of the magnitude of regional warming, as I said, less urgency. Confidence in precipitation, much less even than warming. We believe that there will be a 10 per cent increase in overall precipitation worldwide. But how that will be dis-

tributed, not a great deal of confidence. How that will affect Canada, again, not a great deal of confidence.

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We know, for example, that although precipitation will go up, the amount of evaporation will also go up. Therefore, the effect on water resources means that there will probably be less water available, more coming down but more going up so that the amount available for crop growth, etc will be reduced. As to the extent of that on a regional basis, probably the most uncertain of the science.

Climate change: It is probably the most complex environmental issue that we have tried to deal with to date. It has every sector of the economy involved. It has every level of government involved. It has every country around the world involved. No single country can solve it on its own. We have to work together. It has a mixture of man-made and natural causes giving rise to the scientific debate. It has all of the stakeholders involved.

When you compare this with the ozone problem and dealing with CFCs, this is at least one order of magnitude more difficult, maybe two. And the solutions are very difficult to foresee.

Mr Callahan: Speaking of natural causes, why do volcanic eruptions cool the atmosphere? Is there not CO₂ in some of those explosions?

Dr Dawson: It cools it by reflecting more incoming radiation, so less radiation comes in.

Mr Callahan: So the stuff that blows out of there stays up there.

Dr Dawson: It stays up there for a year or two until it is washed out by precipitation.

The final overhead that I would use is, I would go back to the quotation from Neil Armstrong when he visited the moon back in 1969. His comment was, "When you look at the earth from the lunar distance, the atmosphere is just unobservable." It is so thin, a small valuable resource. We are going to have to face the fact that we have to learn how to conserve it and use it wisely.

That is my presentation.

The Vice-Chair: I am at the will of the committee here. Would we like to ask some questions of Dr Dawson now, or hear from Mr Cuthbert first and ask them both questions simultaneously?

Mr Kerrio: Let's hear the other gentleman as well.

The Vice-Chair: We have with us Doug Cuthbert. Mr Cuthbert received his bachelor and masters degrees in civil engineering from the University of Waterloo. Since that time, his work experiences have spanned the country and have encompassed a range of water resource management issues, primarily of a hydrologic, hydraulic and coastal engineering nature. His concentration has been on the Great Lakes water issue. Presently, Mr Cuthbert is the chief of the water planning and management branch in Environment Canada's Ontario region office in Burlington.

In addition, Mr Cuthbert is the national director of the Canadian Water Resources Association, a registered professional engineer and has held a number of positions in support of the International Joint Commission activities.

Mr Cuthbert: As you said, I work for the regional office of the inland waters directorate of Environment Canada and I am located at the Canada Centre for Inland Waters in Burlington.

We were initially scheduled by the clerk to make a presentation yesterday and the presentation would be on the potential impacts of climate change on the Great Lakes. I appreciate the committee's flexibility in allowing us to change to today to basically follow Dr Dawson's presentation.

Kirk Dawson has really got the lead responsibility for the climate change work in Environment Canada in a Canada climate centre in Downsview. In addition to mine now being a subset of his presentation, Dr Dawson basically has set the context for me to really deal in a more specific way and in a little briefer way with the focus of climate change on the Great Lakes. So I do not have to go through all the other information.

As a senior manager in Environment Canada's regional office, I am responsible for water programs in the federal mandate. I get involved with issues of Great Lakes water levels; as you recall, high levels in 1985-86, and since then they have reduced.

Interjections.

Mr Cuthbert: I think I made a presentation to his committee a few years ago.

Mr Kerrio: Bob Rae complained about it and we reacted.

Mr Cuthbert: I also get involved in Great Lakes water quality in the federal role; environmental assessment—we have been down at Hagersville as well in the last couple of weeks; flood hazard mapping—we operate jointly with the province and the Ministry of Natural Resources; water use, and water demand issues. My office is an operational office, but we link with the research communities in the federal research centres, specifically Canada Centre for Inland Waters. As you said, Mr Chairman, I am an engineer, not a scientist per se. I can perhaps make some more rash projections and chalk it up to being an engineer.

In the presentation I want to focus specifically on the potential impacts of climate change on water and on the Great Lakes. The context of water in the Great Lakes really focuses on the levels of the Great Lakes and the flows in the interconnecting channels between the lakes. To some degree, I can or will speak on the effect of climate change on water quality, on hydroelectric power, on commercial shipping on the Great Lakes and other related interests like fisheries, small-craft boating, wetlands and wildlife. They are all linked and they are linked through the levels and flows in the Great Lakes themselves.

The main sources of my information are actually five separate items.

One is the proceedings of an international conference that was held in September 1988 in Chicago. It was titled *The Impacts of Climate Change in the Great Lakes Basin*, and Environment Canada jointly organized that with United States agencies. A set of proceedings was put out from that symposium which highlights specifically the Great Lakes and the impacts of climate change on them. I view it as sort of a summary of the state of the art of climate change as it was then—that was almost two years ago—and the scientific opinion on the various effects of climate change in the Great Lakes.

The second was draft proceedings of a follow-up Canada-US workshop. It was held just last December, December 1989, and it was a workshop that was held by, again, Canada and the

United States—Atmospheric Environment Service was a lead agency in Canada—and the topic was Policy Issues Responding to Climate Change in the Great Lakes Basin.

A third area that I am drawing from is climate-change work that was undertaken as part of the International Joint Commission's current bilateral study of fluctuating water levels in the Great Lakes basin.

The fourth source of information is a report series by the Atmospheric Environment Service on climate changes. They put out quite an extensive series of reports looking at the impacts of climate change on, for example, the recreation industry, skiing, a whole range of things. That is a valuable source of information.

Lastly, a source of information is Environment Canada's monitoring of meteorological conditions and hydrologic conditions on the Great Lakes.

The AES studies—the report series of AES—and the scientific presentations in the September 1988 workshop—that was this one, *The Impacts of Climate Change in the Great Lakes*—as well as general scientific community views, as Dr Dawson mentioned, are pretty much in agreement that the first impact on the Great Lakes basin due to climate change will be an increased air temperature. The view is that the increased air temperatures due to doubling of the CO₂ levels could raise the mean annual temperatures in the basin by about 3.5 degrees centigrade. That is consistent with Dr Dawson's presentation, but this focuses on the lakes themselves.

Second, there will be an increase in mean annual precipitation, and there the estimates vary somewhat. The sum result of the increase in air temperature and precipitation in a hydrologic or water-balanced concept is that we will have increased precipitation. We will also have increased evaporation. Increased evaporation of water will, in fact, more than offset the increase in precipitation throughout the region, so we will have a net reduction in regional water supplies.

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I can return to that point in a minute because that has other repercussions, but there are other projected impacts of climate change that have significant impacts on agriculture which in turn will cause an impact on water supply and water demand in the region. If you have warmer temperatures, if you have increased agricultural potential due to increased temperatures, you will also have increased demand for water for growing.

The energy sector which we are focusing on obviously hydro power, the use of power, the use of electricity, the air-conditioning in the summer will increase. There will be an increase in weather variability projected from climate change and the speculation as to how it will vary is certainly a bone of contention, with a lot of discussion. The feeling is there would be quite a change in the variability of the weather.

The range and sort of detail of these impacts, I think, are something that is difficult to go into in depth in a short presentation, but I believe this document probably covers the range of them quite well. You will be hearing from other speakers on it as well, so I will not go into the detail of that.

The proceedings of our workshop in December on policy issues, which we feel the Great Lakes region should consider, will be out, I expect, in the next month or two. Again, that is an international group that is putting that together, so there are Canada-US consultations on it. We have, in our workshop, had three different groups which addressed policy issues. One was on energy, one was on agriculture and the other was on water.

A continuation of this joint bilateral undertaking between Canadian and US organizations has recommended that the Great Lakes basin be used as a site to conduct a pilot program of definitive climate-change studies basically looking at the Great Lakes; not necessarily because it is going to exhibit extreme impacts of climate change—it may not do so—but it will have a large impact in that the economy of Canada and the economy of the US are going to be affected to a large degree.

We also have a concentration of scientific communities within the Great Lakes basin. It is an area where we can have international co-operation in these studies, and we will probably end up sharing information between Canada and the US focusing on the Great Lakes themselves.

Kirk Dawson mentioned the application of global circulation models to the world and to the impacts on the North American continent, the global circulation models that we have looked at in the International Joint Commission reference study number three. We applied the global circulation models to the Great Lakes area to try to determine the impacts of climate change on water supply to the basin.

That information starts to cause a little bit of argument among some of the scientific community because the feelings are that the grid size, the accuracy of those general circulation models, is not accurate enough to definitively predict what will happen in a small area like the Great Lakes. But we did the best we could and we applied three models to the Great Lakes, defined reduced water supplies, defined what happens when those water supplies were applied to the lakes and came up with a projection of what might happen to the Great Lakes level under doubled CO₂ conditions.

The vertical columns indicate three models—the Goddard Institute of Space Studies model, the Geophysical Fluid Dynamics Laboratory, the Oregon State University—GISS, GFDL, OSU, are acronyms for the type of model. They basically, being applied to the Great Lakes in a hydrologic modelling process, gave us estimated impacts on levels of the lakes—the mean levels, the maximum levels and the minimum levels.

The three models for Lake Superior said, on the first one, that the mean level of Lake Superior really would not change much; the second model said it might reduce by two and half feet, and the third model called for a reduction in mean levels of Lake Superior by 0.8 foot.

That magnifies, when you work your way down the system in the lakes, like anything else in the Great Lakes, so by the time you come to Lake Erie, which gets to be more volatile than others in many different ways, the mean level of Lake Erie could reduce by as much as two and a half feet to perhaps 6.3 feet. That becomes very, very significant to shoreline property owners, to any interests on the Great Lakes basin.

This of course considers all other conditions being fixed. If we were, in fact, to experience levels on the lakes six feet lower than we have today, there would be some action taken to offset that. There would be a moot point. Whether we build dams at the outlet of the lakes, whether we spread oil on troubled waters to reduce the evaporation or whatever happens, there probably will be some reaction. As Dr Dawson said, all other conditions remaining the same, with no intervention, we have a worst-case scenario. We do, as well, with the Great Lakes system.

If the lake levels were to reduce by this much, it would have repercussions for all the varied Great Lakes sectors, from wetlands and wildlife to commercial shipping sectors. Commercial shipping, for example, on the lakes would be seriously affected because you would have reduced draught and load restrictions for the shipping community now on the lakes, and

you would also have difficulty in harbour access and in transferring of goods in harbours.

Mr D. R. Cooke: Your figures there show a greater reduction in Lake Michigan and Lake Huron than in Lake Erie. I would have thought it would be, as you were saying, progressively higher as you went through.

Mr Cuthbert: Yes, the difference between those is a function of the way Michigan-Huron reacts to water supply variations. Michigan-Huron, at the moment, has reacted in a wider variation rate than Erie has because of the nature of the hydrologic system. I view them as very similar to each other. The differences are magnified a little bit in Michigan-Huron, and they are smaller on Lake Ontario than you might think because Lake Ontario has a controlled outlet and the range of levels is sometimes narrowed.

Mr D. R. Cooke: I see. Thank you.

Mr Cuthbert: Getting on to other impacts of water level variations like this on the Great Lakes, there would be difficulties in accessing domestic, industrial and agricultural water supplies. For example, water intakes for thermonuclear power plants would have to be extended. For municipalities, water supply intakes would have to be extended to get into deeper water. Climate change will also cause an impact on water temperatures in the Great Lakes. We will have higher water temperatures in the lakes themselves, and that in turn will have a snowball effect on the fisheries and on other aquatic life forms, as well as probably on the general water quality of the lakes.

Mr Kerrio: How about the generating capacity, hydraulic?

Mr Cuthbert: In the context of the amount of water through the plants?

Mr Kerrio: Yes.

Mr Cuthbert: I will come to that in a minute, but it will have an effect, as you know. There is speculation that if the lakes were to warm significantly, there would be a change in biological activity in the lakes and hence a further effect on water quality problems.

The period of ice cover on the lakes will also change and could be reduced in duration by anywhere from a month to three months. The timing of the seasons on the lakes may also be modified, and the proportion of precipitation falling as snow versus rain will also change.

As to your concern, Mr Kerrio, the effect on electrical energy producers is going to be reduced flows in the interconnecting channels. As you know, there are major hydroelectric plants in both Canada and the United States, on the St Mary's River between Lake Superior and Lake Huron, on the Niagara River, certainly at Niagara Falls and in both the provinces of Ontario and Quebec and in New York state on the St Lawrence River.

Under these projected climate change conditions, these plants would experience flow and power reductions in the order of about 25 per cent. I should mention that under natural climatic variability we already have water level fluctuations that are not any different from this and we will continue to have natural water level fluctuations. But in addition to what we naturally have, we will add climate change effects such as this, so we will be looking at new projected low-water level conditions on the Great Lakes that we have not experienced in more than a century.

Mr Kerrio: The climatic condition that you talked about on the Niagara River varies by 50 per cent, depending on the tilting of Lake Erie, with prevailing winds from the west as opposed to the east.

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Mr Cuthbert: Within a day, that is correct. Also, from a high-level condition on the lakes to a low-level condition, it varies that much. But superimposed on top of that now, we will have another impact.

I can also leave a copy of the current International Joint Commission water levels report which was put out last summer, and it addresses some of the information I have been mentioning now. This was produced last summer and it basically says climate change conditions are also going to have to be factored into any management or policy decisions relative to the Great Lakes and fluctuating levels on the lakes.

I expect, Mr Kerrio, you probably will be hearing more on this. I understand Ontario Hydro is having a presentation later this week and it is looking at Beck 3 at Niagara and the question of the feasibility of Beck 3.

Mr Kerrio: If we take this into account.

Mr Cuthbert: Certainly it has to be considered and addressed, but the feasibility of the plan has a lot more items under its consideration than climate change and perhaps that is another issue altogether.

Now, speaking about the 1980s and the question, "Is climate change being experienced now?" Dr Dawson mentioned that the continent has experienced six of the warmest years of the last century in the past decade—sometimes I have heard three, sometimes I have heard four—the point basically being, though, that the 1980s had a period of unusual conditions on the Great Lakes themselves. In 1985 itself we had record precipitation for this century over the Great Lakes basin. The highest precipitation on the basin-wide basis for the century occurred in 1985. That followed on the heels of above-average precipitation conditions, and Mr McGuigan was involved in the committee on that case.

That, of course, caused record levels on all the Great Lakes, and I have here basically a plot of levels on Lake Huron. The peak in Lake Huron in 1985 set new records for the century, but since 1985 the levels on Lake Huron have dropped dramatically to what is now in the order of six to nine inches below average as of this past month.

In 1985, levels were three to four feet above the 20th century averages, and considerable shoreline flood and erosion damages were experienced. Since then we have had very, very dry springs in both 1987 and 1988 and the levels have fallen rather dramatically. In fact, the rapid three- to four-foot reduction in Lake Huron and Lake Erie levels since 1986 is unprecedented.

Mr Kerrio: This is in metres.

Mr Cuthbert: That is correct, but I end up talking in metres or feet. The plot is in metres.

Mr Kerrio: It has gotten really confusing.

Mr Cuthbert: It has fallen over a metre; in the order of a metre and a third, about four feet. The change is really unprecedented in this century. We have never had a drop as quick as we have had since 1986, in water levels, at any time previously in the century. In fact, the drought conditions from November 1986 to November 1987, in the context of water supply to the

whole of the Great Lakes, were a record that exceeded the previous record drought conditions in the early 1930s.

What we therefore have experienced on the lakes are situations similar to what an AES researcher about three or four years ago suggested as a precursor of climate change.

I did not speak to him on this, Kirk, but Stuart Cohen of AES some years ago said the impacts of global warming on the Great Lakes would be an increase in evaporation or evapotransformation; a decrease in snow melt and an earlier peak in snow melt; there would be a decrease in runoff across a large area; there would be a decrease in soil moisture; of course, an increase in surface evaporation from the lakes; an increase in overlake precipitation; an increase in surface water temperatures in the lake; a decrease in ice cover; a decrease in the water supply of the lake, and a decrease in lake levels.

We basically have had all of those occurrences in the last few years. There is no really irrefutable evidence that climate change has arrived right now and none of the scientists will say that, yes, we are experiencing climate change. But on the other hand, they will not say that we are not. As the climate and hydrologic conditions really have been within the natural variation that we have experienced over the last century, we cannot really state that we are experiencing the beginning of a trend towards climate change. On the other hand, perhaps in 10 or 20 years we will be able to point to the 1980s as in fact the beginning of that trend.

That is basically all I have to say in a formal way to your committee. They are some thoughts that we have looked at and said, "Do you go out on a limb and start speculating?" In pure science you do not. But from a context of managing what is happening on the lakes, I think we do have to have our policy, we do have to have our plans in order now in order to make decisions about reduced water supply conditions, impacts on the water resources to the lakes and energy.

The Vice-Chair: I know we have some questions.

Mr Pollock: There is a little pest that we have in the Great Lakes that, according to some of the information I have, is causing warming in the Great Lakes, and that is the zebra mussel. Apparently this particular pest cleanses the water, which is good in one way, but then once it cleanses that water, the sun can shine right down into the water quite a way further. Naturally the Ministry of Natural Resources people are very concerned over the fact that this is going to have an effect on the fish, because the water is going to warm and they just cannot survive in extremely warm water. Do you have any comments on that?

Mr Cuthbert: The zebra mussel has been a concern to a lot of people relative to what impacts it will have. Certainly it is going to reduce the algae growth in the water. It basically feeds by straining the water and straining the algae out. Then we will have an increase in clarity of the water, and that has already been apparent in some small areas.

I have not seen any scientific speculation relative to what that is going to cause as a ripple effect on water temperature and the rest of the ecosystem. What I have heard relative to the zebra mussel is that it impacts on water intakes because it sticks to them and makes an increased difficulty in getting water into municipal water intakes. It will change the ecosystem. It will change the food chain.

I have not heard of any evidence relative to water temperatures, because the other aspect of it is, if your water is murky, it has a tendency to absorb heat, as well, in the higher levels. The temperature of the water, I think, due to climate change and the

air temperature, is more of a concern in that we will have an increased temperature in water, and we have experienced that in the last two or three years in the Great Lakes, again within natural variability, but that had an impact on the biological productivity of the water and on water quality. The water starts to stratify earlier, you get a thermocline earlier and your dissolved oxygen content changes throughout the whole structure of the lake. I think the lake temperature, due to mean air temperature, would probably be overriding the zebra mussel effect.

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Mr Pollock: But the period you are talking about in the past two or three years is the period that those zebra mussels have been in there, and in large quantities. Therefore, they are causing all kinds of problems, as you mentioned, in the intake lines of municipal water supplies.

Mr Cuthbert: They are not throughout the whole system yet. They have really only started to appear in Lake Erie, and the odd few have been noticed in the eastern end of Lake Erie. I think we are going to see an increased clarity, if you would, in the water of Lake Erie due to the zebra mussel, but what effect that will have on temperature, I am not certain.

Mr Pollock: I do not know either.

Mr Cuthbert: There is not much scientific opinion on that issue.

Mr Pollock: As I mentioned, it was the opinion in some of the documentation we got from the Ministry of Natural Resources that it would have an effect.

Mrs Grier: Did you say that you were going to have to begin to factor in the effect of climate change into the decisions or that you were factoring it in?

Mr Cuthbert: We will have to. Water resource projects always factor in a range of variability. In flooding conditions or low water supply conditions, there is a natural variability that you always must consider. Climate change is still within that normal variability, but it is causing a trend that makes our projections, instead of narrow, go wider, because it is projected to have an increased change in weather variability and also a reduced water supply. For example, for construction on the Great Lakes, I think we have to look at the potential for lower levels. We also have to have a contingency plan. If levels would drop below what they were historically observed to be back in the early 1960s, then we should have some contingency plans to adapt to that.

Mrs Grier: What is your process? When would you begin to factor that into the decisions, and what has to happen before you can start to do that?

Mr Cuthbert: It has already started now in the International Joint Commission's studies on lake level fluctuations. That is being considered now.

Mrs Grier: Two of my particular concerns, and I guess they do not particularly relate to this, are remedial action plans and the cleanup of contaminated sediments. As lake levels drop, is it correct to foresee that perhaps areas of contaminated sediments may in fact begin to become exposed?

Mr Cuthbert: Yes, exactly, and that should be considered in those remedial action plans.

Mrs Grier: And yet, again, in my own particular community, where there are extremely contaminated sediments, it has been recommended they be left in place while things happen and no effort be made to remove them. But as levels drop, that is surely going to become a less attractive option.

Mr Cuthbert: I cannot speak to that because it would be site specific. It would depend on the actual remedial action plan area. If we are speaking of Hamilton harbour, with which I am most familiar, the concerns are that if the water levels were to drop in the area of a metre, then the actions to address water quality improvement might be quite different. That is an example of one. In fact, if you were to leave the sediments there and the sediments were then to become exposed to the air, that might be a different kettle of fish from having them covered in water.

Mrs Grier: Are you building that into your discussion of options in those situations?

Mr Cuthbert: Every group that is looking at remedial action plans should consider that.

Mr J. B. Nixon: I have a question for Dr Dawson. During the course of your presentation, one of the slides you presented showed three possible trends in terms of global warming, dependent upon remedial action taken by the government and the private sector, one being no action, the blue line shooting straight up; one being the middle line, if some action was taken, and one being the yellow one, which I think was a flat line. That was a case where, as you put it, economically unacceptable actions were taken. If those were not exactly your words, that was the sense.

Dr Dawson: Not exactly, but close.

Mr Kerrio: I guess that is the red line, though, is it not?

Mr J. B. Nixon: Over a period of five, 10, 15 years, I can sort of understand that we would try to balance the needs of the economy and the needs of the environment and come up with an acceptable action program, but if the problem was to end in 10 or 15 years, I would say, "Okay, let's try and do that balancing act." But as you earlier pointed out, prior to talking about that slide, the problem does not really end, it just continues. So if we get to the end of the middle trend mark, at some point we are going to have to make the decision that we are going to take action which is economically unattractive, close industries down and put people out of work. Is that what you are suggesting?

Dr Dawson: I am saying that ultimately one will have to take actions that are economically unattractive, yes; very definitely. If economic growth continues to be based on fossil fuel usage, then we will have a major problem. What we have to do very slowly and carefully is decouple economic growth from fossil-fuel energy dependence. That is not going to be something you do overnight.

Mr J. B. Nixon: Is it fair to say then that if we could decouple economic growth, development and continuance from the use of fossil fuels, we would have effectively solved the problem?

Dr Dawson: If we do that decoupling ultimately in every country around the world.

Mr J. B. Nixon: We would solve the problem.

Dr Dawson: Yes.

The Vice-Chair: I wonder if I could jump in here for a moment. We have talked about an increase in atmospheric variability. Are you telling me that you think it will not just be, on average, warmer but that you will have increasing highs and lows and storms, more like a tropical area, more severe storms, that kind of thing?

Dr Dawson: There is a significant amount of speculation that a warmer world will experience greater variability, yes. There has been some speculation that the intensity of storms would increase, but an analysis of the model results that we have produced would indicate that that does not appear to be significant. What will happen is that you will experience greater fluctuation and more rapid fluctuation, so one expects to see an increase in the variability of weather.

The Vice-Chair: Thank you. Mrs Grier had a question.

Mrs Grier: Yes; to Dr Dawson: I gather from your presentation and from others we have seen that really all of the data collection is relatively recent around this area, five or six years. Is that correct? Nobody seems to start any earlier back than that.

Dr Dawson: The data collection has been going on since mankind has been taking observations. Canada has observations going back 150 years. In fact, we are going to celebrate here in Toronto this year the 150th anniversary of the first observation taken in Canada. Our record goes back 150 years.

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Mrs Grier: What about forecasting? When did we begin to forecast trends in temperature rise and emission levels?

Dr Dawson: We started forecasting weather back at the time we started taking the first observations. In terms of looking at the issue of the greenhouse effect and its dependency upon the atmosphere, the greenhouse effect, I think, was first speculated upon scientifically at the turn of the century. I think the scientific consensus that human activity was actually changing it has occurred in the last decade. The key meetings that took place on this were in 1985, 1986 and 1987 in places called Villach and Bellagio, where scientists came together and said, "We really have a scientific concern."

In terms of being able to model these things and do these experiments that I am talking about, that really has occurred only in the last five or six years. To be able to run a general circulation model of the type I am talking about requires a significant amount of computing power if you are going to do it with any degree of accuracy or resolution. For example, the simulation that we ran took approximately a year, using the fastest supercomputer in the world. That is a lot of time and a lot of effort.

Mrs Grier: It was the accuracy I was coming to. I was wondering whether you had been doing it long enough to be able to say. When you predict today that this is what the emission level will be on this scenario or that scenario, or this is what the temperature rise is anticipated to be, what has the record been over the time that you have been doing this forecasting with respect to accuracy?

Dr Dawson: That is a very difficult question to answer. These are not predictions, they are simulations. They are not something that we actually can verify yet. We have not lived through the necessary change, you could call it. In terms of whether they predict the current climate, which is the best thing to deal with at this point, the answer is that the Canadian model predicts current climate. Two of the three models that were used

earlier did not do that. They predicted very strange climates. They were totally unrealistic, and therefore you could say that their future prediction was questionable. I think we have moved the state of the science now where we can simulate the current climate, and therefore we have an enhanced level of confidence in the future simulations. They are not like weather predictions where you can check yesterday's prediction today. It is going to be a decade or so before we can look back and say, "Yes, those were fairly good runs," or "They were fairly poor."

Mrs Grier: One of the things that is mentioned as an achievement as we have begun to wrestle with this problem has been, of course, the setting of the target of a 20 per cent reduction in emissions from the 1988 levels. Am I correct in my understanding that that is not going to do anything to reduce the concentrations that exist? If so, can we really claim it is an achievement to have reached that 20 per cent level, assuming we reach it?

Dr Dawson: Two answers to the question, because there were multiple parts in that question. Canada has not adopted the Toronto target as an official policy position, nor has any government in Canada. The city of Toronto has indicated it is prepared to accept it, but certainly the federal government has not adopted it as a target, and neither has your government. In fact, I think the discussion paper released by the province of Ontario on Friday talked of stabilization of emissions.

Mrs Grier: No, of concentrations.

Dr Dawson: Okay. Stabilization of concentrations is a very interesting goal. Most countries are talking of stabilization of emissions. Stabilization of concentration is a very difficult thing to achieve. I do not believe that under any scenario we can achieve stabilization of concentration at this point.

Mrs Grier: So is there any point then in setting the 20 per cent? If nobody is prepared to adopt it and if it is not really going to do anything about the concentrations, why—

Dr Dawson: If you were to adopt a 20 per cent reduction in emissions by the year 2005—20 per cent below the 1988 level—you would see a stabilization probably in the year 2060 at probably about a doubling of the current concentration. So if you were to do that, you would achieve some balance late in the next century.

Mrs Grier: Is that good enough?

Dr Dawson: From an environmental effect? That is a very difficult question to answer. I do not know.

Mr Cuthbert: From an environmental effect, it is a damned sight better than allowing it to continue to escalate in an exponential way and in a way that we cannot adapt to quickly enough to keep up with the change.

Mrs Grier: So its main virtue is that maybe, if we run hard, we can adapt to it.

Mr Cuthbert: Quick enough. But if we do not pull the reins in on it, we may not be able to run hard enough to adapt to that change.

Dr Dawson: The key is really early action. The early actions are much more beneficial than later actions, because you have the cumulative effect of that action now. CO₂ resides in the atmosphere for anything up to 100 years; therefore, the more you stop producing now, the less action you will actually have to take further down the road. The more you produce now,

the harder will become the decisions in a decade's time. So some preventive measures taken now are much more beneficial than letting things go and then taking action.

Mrs Grier: Ontario's proposed goal is to provide leadership, whatever you interpret that as being, in stabilizing concentrations, if we say we want to stabilize concentrations.

Dr Dawson: I would like to stabilize concentrations of greenhouse gases.

Mrs Grier: What would we have to do to do that?

Dr Dawson: When would you want to achieve that? If you wanted to achieve that, say, by the end of the century, you would probably have to reduce emissions now by 30 per cent or 40 per cent, but that is speculation on my part. You have to remember that no one country could stabilize concentrations in the atmosphere. It has to be done as a collective international decision.

Mrs Grier: But if everyone says, "After you, Alphonse," nobody will ever start.

Dr Dawson: That is right, very much so. That is why I would urge that you start.

Mrs Grier: That is a federal position, is it?

Dr Dawson: That is a personal view as an expert witness.

Mr Pollock: There is no question about the fact that there is a gradual, global warming trend. We have all the data to prove that. On the other hand, as has been mentioned here before, we had one of the coldest Decembers on record, and I would say that the first week in March has been one of the coldest weeks. I do not know what the records say, but it just indicates that it is one of the colder weeks. But through January and February, it was way above average, it was warmer.

Of course, it really did not affect us here, but if you go down to Florida—it used to be that in 1979 you could go up on the citrus tower there and you would look for miles each way and there was nothing but orange groves. Now there is nothing, because they have had different frosts that have killed them right out. So the citrus growers had to move their orange plantations and groves at least 100 to 200 miles farther south to be able to even grow oranges, which they normally did up around the citrus tower in that particular area. It is going to be a little hard to sell these problems to those people who went to a tremendous expense moving those citrus groves further south. I just wonder if you have any comments along that line, why that happened.

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Dr Dawson: You are going to see at any point in time variability in weather. These temperature changes we are talking about are averages over a period of years. They are, for example, the average of 10 years of running. In fact, you will see normal climatic variability; you will see new record low temperatures; you will see new record high temperatures. If you take December and January and average them, it was a nice average two months, a spot on the norm for those two months. I think it relates to the question asked by your chairman, do we anticipate an increased variability? The answer is yes, we anticipate more record maximums and potentially, at the same time, more record minimums.

Mr Cureatz: On that, with the map on the northern hemisphere, it would appear we would be, although affected in ex-

extremes—our extremes will not be as catastrophic as those in the more southern hemispheres. You mentioned the famine area, where even a slight variance will be of great significance. Am I right on that?

Dr Dawson: I think the key for the Sahel is the availability of moisture; that, more than temperature. An extra degree or so of temperature in those areas is not as—no, I do not think as affected, but perhaps you would like to comment on the water aspects, rather than I.

Mr Cuthbert: Certainly, if you look at the Canadian Prairies, right now every river in the southern part of the Prairies is in a water-deficient situation. They cannot get enough water to supply the agricultural community, and that is going to increase as a problem. So the land, although it is perhaps fertile, will not be productive because there will not be the water.

In southern Ontario we have the Great Lakes and we say that is an immense source of water, but if the demand on the water in the Great Lakes were to escalate to supply agriculture, then we are going to perpetuate the problem and exacerbate it to the point where the projections of water levels in the lakes will even be lower because of the increased consumptive use of water.

Mr Cureatz: So it is one thing about the fluctuations in temperature, but you have to look, along with that, at the moisture.

Mr Cuthbert: Yes. As Dr Dawson's slide on agriculture mentioned, there will be a potential increase in agriculture as long as we have the water to go with it. But that will, in turn, stress the communities that depend on that water source and use it for other purposes. Where is the tradeoff?

Mr Charlton: Just a couple of very brief questions, at least for my head to clarify what I think you said and others have told us. It seems to me that one of the things you are saying is that, because of the delayed reactions in the atmosphere, the three or three and a half per cent temperature increases that your models are indicating are likely to happen between now and the middle of the next century, regardless of what we start doing now to prevent more temperature rise after that. That is pretty well set?

Dr Dawson: No; I think if we took action now, we could limit it to about a degree to a degree and a half.

Mr Charlton: Cut in half, then, roughly, what your models are now predicting.

Dr Dawson: Yes.

Mr Charlton: As I understand it, stabilizing the concentrations in the atmosphere—in other words, reaching a stage where the concentrations are not growing but they are not shrinking either, the global warming will still continue to happen but just at a much slower rate.

Dr Dawson: No. If you get to stabilization, if you stabilize the concentration, you will stabilize the greenhouse effect and thereby achieve a stable climatic regime, as stable as it ever is.

Mr Charlton: Going back, though, to this delayed reaction, for example, if we reach a point in the middle of the next century when concentrations are stabilized, how long will it take before the impact of that is seen?

Dr Dawson: Perhaps 30 years, 50 years; it depends.

Mr Charlton: So somewhere into the following century.

Dr Dawson: Yes.

Mr Charlton: You are saying that at the end of that period, at the beginning of the following century, or 10 years into the following century, it will only have gone up 1.5 degrees roughly, 1 degree to 1.5 degrees.

Dr Dawson: If you eliminated emissions now of all greenhouse gases—

Mr Charlton: Immediately.

Dr Dawson: Immediately.

Mr Charlton: Which is not going to happen, but okay.

Dr Dawson: —you would stabilize concentrations at the beginning of the next century.

Mr Charlton: Okay. Thank you.

The Vice-Chair: Thank you, gentlemen. I think you have given us good food for thought. It is refreshing to have a more localized view of what the greenhouse effect may be on Ontario. I have one small announcement: Tomorrow and Thursday and Friday we are moving to room 151, the Amethyst Room, for our hearings.

Interjection: Live coverage?

The Vice-Chair: Live coverage. Everybody comb his or her hair.

The committee adjourned at 1550.

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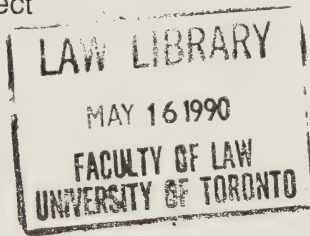
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Global warming and the
Greenhouse Effect



Chair: Barbara Sullivan
Clerk: Todd Decker

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Réchauffement planétaire et
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Président : Barbara Sullivan
Greffier : Todd Decker

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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Wednesday 7 March 1990

The committee met at 1012 in room 151.

GLOBAL WARMING AND THE GREENHOUSE EFFECT (continued)

The Chair: We now have a quorum and I would like to begin the third day of our initial hearings. Today's agenda concentrates more on the international aspects of the global warming question.

DEPARTMENT OF EXTERNAL AFFAIRS AND INTERNATIONAL TRADE

The Chair: Our first witness is Brian Herman, deputy director of the energy and environment division of the Department of External Affairs and International Trade. Mr Herman joined the department in 1973 and has since enjoyed postings to the United States; to Belgium, as a member of the Canadian delegation to the North Atlantic Treaty Organization; to Dacca, Bangladesh; to Vienna, and London. In 1989 he was assigned to his present position in Ottawa.

Welcome, Mr Herman.

Mr Herman: Thanks very much. It is a pleasure for me to be here today. I must say this is my first visit to Queen's Park and the first time I have been talking with provincial legislators.

In the Department of External Affairs and International Trade, we are pleased to see the general increase in interest in global warming, or as we call it, climate change, within the public, within government circles and within parliaments.

I have been asked to concentrate on the international aspects of how Canada, in concert with other countries, is dealing with climate change. I thought I might look at the institutional aspects and some of the major issues being examined and try to put both in the context of a critical path over the next few years that is really guiding our efforts. I also thought I might focus a little bit more on the energy dimension, given my audience today.

First, I would like to say that I will make available to the committee, to Todd Decker, an informal working paper that we have prepared in the energy and environment division but in consultation with the Department of Energy, Mines and Resources and Environment Canada, providing some introductory background material to the international debate on energy, environment and climate change. It has not been updated since December—we just have not had the time—but it is a useful primer, in our view, and it does outline some of the issues and some of the key institutions.

Internationally, Canada has been placing emphasis on three things. We have been very active in trying to advance the science. I will not say any more on this, because Dr Dawson, I know, was here with you yesterday, and we work very closely with Dr Dawson and his colleagues at the Atmospheric Environment Service.

Second, we have been focusing some effort on attempting to broaden awareness and understanding of the issues in Canada and in other countries, particularly in the Third World, which we feel are, or should be, part of the debate. You may know that

a number of developing countries see the climate change problem as one which we in the industrialized world have essentially created and which we are now asking them to help solve, as they see it, through sacrificing their economic development.

Third, we have been particularly active on the development of a framework convention on climate change and the protocols that might be associated with it. Such a convention could possibly be modelled along the lines of the Vienna Convention for the Protection of the Ozone Layer and its companion agreement, the Montreal protocol.

Institutionally, the International Energy Agency in Paris, the IEA, is now very much engaged in the debate. The IEA is in the process of completing what it calls a broad brush study on the impact of energy supply and consumption on the environment. The IEA is also working closely with the Organization for Economic Co-operation and Development, the OECD, in preparation of a joint report on the energy dimension of the climate change issue. Some details of this work are provided in this primer that I mentioned earlier, but I thought you might also wish to have a copy of a statement issued at the end of January by the IEA executive director, Helga Steeg of Germany, on the key issues being addressed in this work. Again, I will make that available, but basically Frau Steeg is trying to point out what are the implications of adopting policies that radically change the way we produce and consume energy.

The Economic Commission for Europe, of which Canada and the United States are members, also has played a role. Many of its sub-bodies deal with several important air quality issues, and the ECE was, in effect, godfather to the important Convention on Long-Range Transboundary Air Pollution, which is quite often called the LRTAP convention, and its two protocols thus far dealing with nitrous oxide and sulphur dioxide. The ECE will be holding a special ministerial conference at Bergen, Norway in May which will be essentially assembling an ECE regional response and review of what has happened since the Brundtland report, or the report of the World Commission on Environment and Development, which was issued in 1987. One of the four major themes at this conference in Bergen will be that of sustainable energy use.

As far as tracing the history of the climate change debate internationally is concerned, I suppose there is no better place to start than the June 1988 Toronto Conference on the Changing Atmosphere. I think that members here will be acquainted with the results. The Toronto conference, of course, produced the famous, or infamous as some would put it, 20 per cent target.

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Since that time, and drawing on the potentially serious nature of the problem which the Toronto conference highlighted, the United Nations environment program, which has been in existence since 1972, and the World Meteorological Organization in 1988 established the Intergovernmental Panel on Climate Change. I am not sure if Dr Dawson yesterday reviewed some of the work being done by the panel, but it is a huge international effort and it has three major tasks: assessing and evaluating the scientific information that is now available;

evaluating the likely socioeconomic impacts of climate change, and formulating realistic options and alternatives for response strategies.

When we talk about responding, this Intergovernmental Panel on Climate Change is looking at both the limitation of climate change and the problem of adapting to climate change. The IPCC will be issuing an interim report in August. The importance of this report and the IPCC's work in general has been acknowledged and endorsed internationally on a number of occasions. There was the Hague environmental summit in March 1989; the Paris economic summit last July, the summit of the seven industrialized countries and the Commonwealth declaration, or what is called the Langkawi declaration, of October 1989. Most recently the issues have been raised in the Noordwijk declaration. That was a meeting in Noordwijk, the Netherlands in November of last year, attended by some 67 countries represented for the most part by ministers of the environment.

So we have the IPCC looking at the science, the impacts and the possible policy responses. When it comes to policy responses, as I said, the IPCC has one major group looking at limitation. That group has two particular foci: energy and industry, and agriculture and forestry. It is also looking at adaptation. That group has two foci as well: coastal zone management and resource use and management.

There are a number of cross-cutting thematic issues as well that are being examined; first, increasing public awareness and promoting education, as I mentioned earlier, in our own countries as well as in Third World countries. Basically the objective is to inform people better on the issues at the individual level and to try to encourage the right habits or a change in habits that would help us deal with climate change.

We are considering how best to use the mix of available economic instruments: regulations, incentives, taxes, subsidies, sanctions and the like.

We are examining this complex issue of technology development and transfer, how the industrialized countries can ensure that those less well off have access to new and improved technologies; for the Third World, usually technologies that it cannot afford or that have been developed in industrialized countries from which it then has to buy.

As I said earlier, we are also considering the legal questions that would have to be addressed in any framework climate change convention.

Finally, we are addressing the financial and funding mechanisms, again looking at the question of how the developed countries can transfer money to the developing world to help it do the things that we would like it to do, working with us to address what is a global problem.

On the legal issues, I do not think it is unfair of me to say that Canada is recognized internationally as having some of the best minds at work on these questions. Within the framework of the IPCC, Canada, the United Kingdom and Malta are co-ordinators of an exercise designed to assemble the basic elements that could be considered in drafting a framework convention. The convention, in our view, could well be the key. Unless we can codify through an international agreement what are our collective objectives internationally in addressing climate change and what are the obligations of individual countries, the other efforts we are putting into addressing the issue could go for naught.

On the convention, some basic questions are the political imperatives of striking the correct balance between those arguing for a far-reaching, action-oriented convention and those

saying that we should perhaps now have a more generalized convention that can be adopted urgently so as to begin tackling the problem. There is the extent to which specific obligations, particularly on things like the control of emissions of carbon dioxide and other greenhouse gases, should be included in the convention itself or in separate protocols.

There is the question of the differentiated approach—should the industrialized countries bear a greater share of the burden by taking more concrete and early actions than the developing countries?—and as I said earlier, and I cannot stress this enough, because it is one of the keys, the extent to which the industrialized countries, which have admitted that they share responsibility for the bulk of greenhouse gas emissions to date, are prepared to underwrite financially the costs of the developing world. This is one particular issue I have been dealing with in a somewhat separate but none the less important exercise, and that is on the Montreal protocol, where we are trying to encourage international action to phase out completely the use of ozone-depleting substances.

I would like to just highlight a few points that are focused on this critical path that I mentioned at the beginning. First, if 1989 was a year of declarations, and there were many of them, 1990 and beyond may well be a period when the public is looking for action. There are a number of key upcoming events. In May, as I said, there will be the Bergen Conference on Sustainable Development; in July, the Houston summit of the industrialized countries; in August, the release of the IPCC's interim report; in October, the Second World Climate Conference, which will be at ministerial level; in 1991, a meeting of the environment ministers of the Organization for Economic Co-operation and Development countries, perhaps preceded by a separate meeting of environment and aid or development ministers, and ultimately what we are looking at is the 1992 United Nations Conference on Environment and Development.

To this I think must be added things that crop up fairly suddenly. President Bush has now announced that he would like to invite senior officials and ministers to a meeting at the White House in April to look at the scientific, financial and environmental aspects of climate change in the context of global change generally. The US Senate, the catalysts being Senator Wirth and Senator Gore, has invited legislators from about 30 countries to a meeting in Washington at the end of April to discuss global environmental problems and climate change.

That is the first point then, all the events that are upcoming.

Second, the IPCC report will, again as I said, deal with mitigation of and adaptation to climate change, but it is not likely that this report will state categorically, "This is what must be done." Rather, when it comes to responses, it will lay out a number of realistic options and alternatives that governments individually will have to consider, based in part on emission scenarios extending out over the next 100 years. Governments themselves will have to make the decisions, but this report will be considered by ministers at the Second World Climate Conference.

Third, the IPCC report will deal with certain key recommendations that were incorporated in the Noordwijk declaration from November. The Noordwijk declaration was important because it did urge industrialized countries to stabilize CO₂ emissions and it did urge investigation quickly on the implications of adopting targets and timetables such as reducing CO₂ emissions by up to 20 per cent by the year 2005.

Fourth, the IPCC report will provide a road map for the negotiation of the framework convention on climate change. As I have said, Canada is one of the key players on this, but as part

of this effort I would reaffirm that we must continue to be sensitive to what the developing countries are arguing for. They would be the first to suffer if climate change occurred on the scale that some suggest, and they really truly perceive that we are saying: "We have created a problem. Now we're asking you to sacrifice to solve it."

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Fifth, we will all eventually have to grasp the nettle of the implications for the pattern of our energy use and consumption. According to the International Energy Agency, total energy demand is expected to rise some 1.3 per cent annually in Organization for Economic Co-operation and Development countries between now and 2005. To meet the illustrative target from the 1988 Toronto conference of a 20 per cent reduction in CO₂ emissions by 2005 would require major changes to the ways in which Canadians and others produce and use energy.

In all of this, I would like to emphasize the close working relationship between the government agencies involved, including the Department of External Affairs and International Trade, the Department of the Environment and the Department of Energy, Mines and Resources. We would not necessarily be all of the same mind on the issues, but we do work closely together in trying to bring our views together.

I would also just like to underscore the importance we attach to the work at the international level. There is the significant work on science, particularly on modelling, being done by Atmospheric Environment Service and the Canadian Climate Centre.

Canada is a member of the IPCC's governing bureau and we are vice-chairman of this very important working group that is looking at response strategies. We are also rapporteur of the subgroup that is looking at the impact on energy and industry, of what might be possible responses adopted to deal with climate change. Canada's rapporteur, Energy, Mines and Resources, provides the individual doing that job.

We are one of the three co-ordinators on the legal issues looking at the framework convention. Finally, we are a major contributor to the trust fund that allows the IPCC activities to go forward. In particular, we provide a lot of support to permit developing countries to participate in the work of the IPCC.

I can confirm to you, from my own schedule, that there are an awful lot of meetings taking place and it is difficult to keep up with all of them, even for a country like Canada.

That is just basically an overview. I realize it is very general, but I thought that might help. I would be glad to answer any questions you might have.

Mrs Grier: It was certainly an impressive list of meetings. Your passport must be an interesting document. I was struck by your phrase that 1989 had been the year of declarations and people were looking for action in 1990 and 1991. But yet when you list those actions—I totalled, I think, nine events and possibly three more in the United States as a result of President Bush's initiatives—I fear that it sounds as though events and action are synonymous. Is that too cynical?

Mr Herman: I think it may be cynical. There is no question that international events like this do sometimes help focus the mind, and ministers are always very loath to go to conferences where the issues remain up in the air.

There were some key events, like the Noordwijk meeting, that did say, "This is what ministers want examined and they want some views on these things." The various meetings in 1989 have all pointed to the importance of the IPCC report.

There will be no hiding from the recommendations once that report is out in August 1990 and once it has been considered, by ministers at the Second World Climate Conference.

Mrs Grier: Yet the Toronto conference, in 1988, was very specific on the actions by government and industry that it felt ought to happen. Canada has not adopted the recommendation that we reduce CO₂ emissions by approximately 20 per cent. Why are they likely to do it after a 1990 conference when they have not done it after the 1988 one?

Mr Herman: The 1988 Toronto target was adopted as an illustrative target, not as an objective.

Mrs Grier: I am sorry, what is the difference?

Mr Herman: The conference basically said that if you wanted to do something, you could do something in the range of 20 per cent reductions. It did not really address the implications of your economic growth, your industrial activity, of doing that.

The IPCC process—and as I have said, it is a huge international effort involving thousands of scientists on the science alone—is looking at the whole question of the science of climate change because, as you know, there are some who argue that we still do not have a problem. There are others who say that the problem is only a moderate one and some who say it is an extremely serious one.

There is a second group, as I have said, and it is part of a network looking at the socioeconomic impacts, which asks: "What would happen to our countries if we did nothing? What would happen if we took a range of steps, if we wanted to reduce by five per cent, 10 per cent, 20 per cent? Over what time—2005, 2030, 2060?"

Then there is the third group, which is looking at, "If we want to get ourselves to a certain point at a certain period in time, what kind of policy actions do we have to take now?" It is looking at the range of things, including looking at what is realistic that can be achieved in a certain time frame and what might be so disruptive to our way of life and our pattern of industrial activity that it might be extremely difficult, if not impossible, to achieve.

The Chair: I think that the committee would be interested in hearing more on what kinds of particular socioeconomic analyses are taking place in relation to Canada. That is going to be very much a part of our agenda in terms of making recommendations about what specific action should be taken in concert with industry and the energy industry. Who is working on those issues in Canada?

Mr Herman: I will gladly leave a paper outlining in detail the organizational structure of the IPCC. Its working group 2 is charged with the assessment of environmental and socioeconomic impacts. It is chaired by the Soviet Union and the two vice-chairmen are Australia and Japan.

It is looking at things like agriculture, forestry and land use, the environmental and socioeconomic impact of climate change on natural terrestrial ecosystems. Canada is very much involved in that. Dr Dawson, who was here yesterday, is our representative on that. It is looking at biodiversity and endangered species, wetlands, which Canada is taking the lead on, wildlife, which Canada is taking the lead on, hydrology and water resources, energy, industry, transport, settlements, human health, air quality, and Canada is involved in that, the world oceans, cryosphere and coastal zones and permafrost. Canada is involved in that.

As I say, it is a huge effort, looking at a lot of detailed issues that, I must confess, I am not entirely familiar with. In my work, we tend to focus on the response strategies aspect of the problem.

Mrs Grier: Is there no indication that Canada is prepared to make a move alone? Are we only going to act in the international context?

Mr Herman: This has been the position that we have adopted, because unless we act internationally and unless we get agreement that everybody is working to the same objective, the things that an individual country will do will really not make an impact at all. One of the problems that we in the industrialized world face—and this is why I mentioned the important element of getting the developing world on board—is that if you look at the pattern of economic growth in China, India, Brazil and Mexico, if we reduce our emissions by 20 per cent and there is nothing done to constrain their economic growth, then virtually everything we in the industrialized world would do over the next 50 years would be wasted because the concentration of greenhouse gases in the atmosphere, the growth in emissions, would just continue.

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Mrs Grier: I understand that, but you dwell at least twice on the very understandable concern of the Third World that it was being asked to sacrifice for the excesses of the industrialized world. To me, it seems much easier to have that discussion with the Third World if we in the industrialized world are beginning to take some steps and are indicating that we in fact are prepared to change the way in which we operate. For us to sit back and say there is no point in Canada doing anything until everybody has agreed on what ought to be done seems to me a total abrogation of any sense of leadership or urgency.

Mr Herman: I am not really saying that. What I am saying is that to solve the problem we have to work internationally. There are a lot of differing views on some of the basic issues, like the science, like what it would mean if we reduced CO₂ emissions by five, 10 or 20 per cent. That is why the IPCC structure was set up, to provide, hopefully, an objective, international assessment of all of the key issues.

As I said earlier, I think it has been generally agreed that when the IPCC report comes out, nations will have to stand up and indicate where they stand in response to what the IPCC will have to say. That does not mean that nations cannot take actions in their own right, as a sign of goodwill or as a sign of the directions in which they would like to see the international community move to deal with the issues.

There are some countries which have taken such actions, and you will hear from Dr Bert Metz from the Netherlands, I think this afternoon, who will tell you what the Netherlands government has done. But I think it is fair to say that those countries which have adopted actions such as indicating they have a target for stabilizing or reducing CO₂ emissions will be the first countries to also say that they do not know how they are going to reach that target. They have set it as a political target and now they are trying to assess what it would mean for their economies to reach it.

What we in Canada would like to do is to look at the targets, look at the overall problem, and then look at realistic ways in which we could reach the target if we adopted it so that it is not an empty figure. We are also trying to say that it is important, if we are going to adopt targets, if we are going to perhaps make sacrifices in our economic development and in our

economic growth, we want to be working in a codified way with other countries to make sure that the obligations, the burdens, are shared equitably. I think we would be remiss in our responsibilities to the Canadian people if we did not adopt an approach like that.

That said, I should point out that the Canadian government is working on a long-term and comprehensive environmental strategy called The Environmental Agenda. It had been hoped that this document would be out by now. It has been put off until the fall. I think you will find that the agenda does address some of these issues and does address questions of energy policy and what kind of things we could be doing right now that make sense in their own right economically, things dealing with energy efficiency and improved energy conservation.

Mrs Grier: If that paper, the Bouchard paper, comes out this fall, are you suggesting that the government might perhaps move on it rather than saying, "We have to wait for the IPCC report in the summer of 1990 before we make any decisions"?

Mr Herman: No, what I am saying is that I think you would find that The Environmental Agenda—and I am not the best person to speak on this—is being developed very much taking into account what the IPCC report will have to say on climate change. The basic elements of the IPCC report will be known in June. The final report will be issued in August, and in order for all the pieces to come together and be available for publication in August, we will know what specific directions it is taking in June.

Mr Kerrio: I would like to zero in on a particular concern that I have. While I am very anxious to think in terms of the global warming as an international responsibility, I am wondering to what degree we address the business of doing things within the confines of Canada, interprovincially.

The question I have of you is, was there any consideration given to the enormous advantage that we had with huge deposits of natural gas when in fact, at the time of deregulation, it was felt that natural gas was not a high enough use in generating electricity and that there was some sort of restriction by other provinces as to what the gas could be used for at the other end? Came deregulation and we had our American friends get involved and get huge supplies of natural gas without any restriction as to what they would use it for.

Given that fact, and given the fact that in the free trade agreement they are also given the comfort that they will get a percentage of the natural gas in the event of a shortage, and that at this very time the Americans are brokers of Canadian gas—we can bring it back at Niagara and Windsor now from the American grid, and Americans are brokering gas, in a sense, that comes from western Canada—did we in fact lose an advantage that we had, I felt, in producing less emissions of a nature that, while there may be the same thermal involvement with the generation—I was thinking that the advantages of doing everything we could with natural gas to replace the burning of coal and other types of nonrenewable resources were tremendous advantages to the provinces across the country and that we have lost those advantages now with the fact that we deregulated.

Remember that when we did deregulate, it was only for new customers; we were still locked in with old contracts in the province of Ontario. I was looking to a real initiative by the federal government to say that we had a tremendous advantage—socially, economically and environmentally—with the huge gas deposits in the country. In a sense, that advantage is gone with the new arrangements, with deregulation, with

huge supplies going into the United States and putting maybe not only Ontario but many provinces at a disadvantage, to replace the thermal capacity with natural gas.

Mr Herman: I am not the best person to talk about domestic Canadian energy policy and arrangements. All I can say is that there is a clear inclination in a number of countries, and this will probably be reflected in the IPCC report, that there are possibilities of switching from oil and coal to natural gas as a way of reducing greenhouse gas emissions.

That presents a number of problems, and this is where governments will have to make difficult decisions. What about those countries which do not have access to large supplies of natural gas or can only have access at a cost significantly greater than using domestic or imported coal and oil? What about governments which have heavy investment in coal production and in oil refining? Will they be prepared to accept the adjustments that would be necessary if you started phasing out the use of coal or if you started, indeed, switching to alternative fuels, the question of the costs of conversion?

These are all sorts of issues which governments are going to have to address if they do wish to tackle seriously the question of reducing greenhouse gas emissions significantly.

Mr Kerrio: What I was trying to get them to consider was that at the time there was deregulation we would consider the advantages and disadvantages of doing it within Canada, because right now Ontario Hydro is bringing in huge supplies of American coal. Looking at our great trade imbalance, I am looking for the social and economic benefits that flow to Canadians by getting our own home in order. I think the question was raised by Ruth Grier, that we should be creating initiatives without looking at the whole international scene as a part of our initiatives.

I would hope there would be some consideration still given to that whole process of a major commitment to less burning of coal, to bringing in natural gas, to even using it as what I consider one of the major alternative fuels for our locomotion. There are just so many advantages that we were not taking advantage of, that by deregulating and letting it flow into the United States, we have lost and we may never recover.

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Mr Herman: As I say, I am not the one who can best respond to that, except to say these various options all have to be looked at. We will have to look at questions such as, do we in fact need much smaller cars, much less powerful cars, that produce fewer emissions? If so, what does that mean for automobile producers, if they have to convert? There is a whole range of costs that go with actions to produce benefits, and governments will have to consider very carefully the relative balance to be struck between the benefits to the environment versus the costs to society.

Mr Callahan: It concerns me along the lines that we have been told that natural gas is a good source of energy and yet this morning, driving in here, I hear that some English company is about to be considered by the federal government to be allowed to buy Consumers' Gas. To me, it seems ludicrous, if we are considering that to be a major and a good type of clean energy, that it would even be considered by the federal government to allow that to happen.

I just thought I would throw that in and maybe you would take it back to Ottawa, because if we are serious about it, then we should not be allowing that to happen, to have another country control our Consumers' Gas.

Mr Kerrio: And Maggie is selling all hers. She could buy over there.

Mr Callahan: Yes. That is really a statement, not a question. It is a message. I am giving him a message to carry back to Ottawa. That is what I am giving.

The Chair: It is the wrong ministry. Do you have a question?

Mr Callahan: No.

The Chair: Thank you. I do have a question and I want to move back into the concept of the 20 per cent target which you have, I think, described quite accurately as having been put forward before the analysis was done by the individual countries. Earlier you mentioned the kind of differentiated approach which is being considered. I assume that would include emissions trading or some kind of protocol that would be set up around it. Were that to happen, I am wondering if there has been an analysis or if there would be an analysis of the kind of differentiated approach that might be taken within a country as well as on an international level.

Mr Herman: Internationally, the differentiated approach basically is one that would deal with the problem by saying that—if, let's say, there was agreement to stabilize CO₂ emissions by 2005, just as an illustration, the industrialized countries, as the Third World sees it, would have to proportionately reduce CO₂ emissions to allow it to proportionately increase so that it does not bear a disproportionate share of the burden, because most of the problem is found in emissions from the industrialized countries. Therefore, we have to take more action and allow them a little room to grow before they have to take action.

At the national level, there has been discussion of the question of tradable emissions permits. The United States is one of those countries that favours this approach. They have produced a very comprehensive document—I do not have it with me, but I would be quite willing to send a copy to Mr Decker—outlining how they have applied this in the United States and how they see it possibly applying internationally.

They have indeed looked at this question of the regional impact, such as creating bubbles in certain regions of the country and telling utilities they cannot go above a certain level of emissions for their various, let's say, power plants.

They have also taken the approach of allowing utilities in one region of the country to build new plants or increase their capacity as long as they have taken a sacrifice somewhere else in the country. There are several different ways that they have tried to approach it, and people are considering this.

The problem at the international level is on what basis and at what level you sort of set your overall ceiling for emissions, because the Third World countries are saying: "What about those of us who do not have huge power plants and huge industry? Does that mean you are going to set a level of emissions, and then in order for us to grow, to foster industrial development, we are then going to have to go and buy rights from you to increase our ceilings so that we can do things?" To them, this is the kind of sacrifice they really feel they cannot afford to make. So there are difficulties when you get to the international level.

The Chair: We heard yesterday from a witness about a trading arrangement which had been made whereby obsolete material from Japan, or tooling material for, I think, the manufacturing of refrigerators, was sent to the Third World, and

as a consequence, that country—I do not recall which country it was—

Mr Pollock: China.

The Chair: Was it China? It was producing less efficient appliances, based on the obsolete tooling materials. Are those kinds of trading arrangements on the table?

Mr Herman: There are all sorts of different arrangements. I think the American paper, if I remember correctly, uses an example of where a utility in the northeast of the United States was permitted to build a new power plant, in return for which it agreed to pay for the costs of reforestation several thousands of acres in Guatemala, or something like that.

Basically, one of the tradeoffs you can look at is, if you increase your emissions in the United States and if you increase what we call the capacity of greenhouse sinks somewhere else in the world, then in effect you are creating a net balance. There are all sorts of creative arrangements that could be used.

One of the concerns the developing world has is it does not want to be locked into obsolete technology. Again, this is something we are working on in the context of the climate convention and technology transfer. If there are new technologies, the developing world wants access to them. It does not want to be locked in to old technologies. It also does not want to feel it is economically going to have to pay to purchase from the industrialized world, for a lengthy period of time, technologies that we have and it does not. It does not want to be held hostage economically to that sort of thing, which is why it is asking in some areas for the industrialized world to underwrite the costs of indigenous technology development, not just technology transfer.

Mr Callahan: Did we not also hear that they were talking about the question of debt to some of these countries being a trading item in terms of their reducing emissions or going to something?

Mr Herman: There are several ways one can look at the question of the transfer of financial resources. One is somehow for the developed world just to say, "We will pay you a certain figure to do certain things." What has been talked about is what they have euphemistically called debt-for-nature swaps. That is, if a Third World country owes Canada \$2 billion or something in debt, or owes certain banks a certain amount of money in debt, it could pay off that debt by agreeing to finance in its own country certain environmentally sound actions. This is, again, one of those creative arrangements that is being looked at. It becomes, at the practical level, in my view, something rather difficult to apply because some of these actions you want countries to take are very, very difficult to quantify and to put a dollar figure on. But it is one of the things being looked at.

Mr M. C. Ray: I would like to know if there is anything on the table with respect to voluntary, private sector initiatives on an international scale. As you speak, I have trouble distinguishing between government actions on standards and the individual polluters within nations. We know there are some international polluters, major companies, operating transboundary that in fact do go to Third World countries on technology transfers, for example, for the very purpose of evading pollution control standards in the developed world. I would like to know if there are discussions on how we might better compel the international corporations to abide by standards on a worldwide basis rather than complying with individual countries' standards internationally.

Mr Herman: I think you touched on the important question of having internationally agreed to standards and codes of practice. It is really somewhat of a separate issue, but I will use what I think is a good example, and that is the Basel convention on the transboundary transportation of hazardous wastes. This grew out of the Third World concern that industries, to circumvent regulations in industrialized countries, were transporting their hazardous wastes and dumping them in Third World countries, in return for which those countries received sums of money. The way to combat that, it was decided, was to negotiate an international convention that said countries like Canada will make sure that their industries follow certain standards and are not permitted to do this sort of thing.

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When it comes to general issues of pollution and pollution control, I think more and more you are seeing countries introduce national standards and regulations to stop industries from transferring the problem from our country to other countries.

Overall, there is also a feeling that what we have to do is not simply regulate but find ways to ensure that industries recognize a basic requirement to be, if I can use the term, good corporate citizens. We are certainly talking with industry, not just on the climate change issue but on general environmental issues. The Business Council on National Issues and the Canadian Chamber of Commerce, representing many Canadian companies, are actively engaged in this dialogue. Both of those organizations have task forces dealing with the environment. Both have indicated that they want to do what they can to be better corporate citizens.

It is a combination of two things. One is that they recognize the need for industry to change its attitudes and the other is for the individual to change. By the same token, I think there is a certain sense of enlightened self-interest. Industry knows what the prevailing attitudes in the country are. They know that if they do not act themselves to improve their environmental image, they may be faced with public pressure, loss of business or government regulation that will force them to do those things.

Mr M. C. Ray: What I would like to know, in particular, is what the Canadian and Ontario governments are doing to compel that kind of compliance from our own corporations. We have trade offices of the federal and provincial governments around the world that assist our own companies, even in investment opportunities abroad, but do we have any input through the government into the kinds of activities they are going to engage in in those foreign countries? I do not think we do. I think we are centred only on assisting them in an investment way and not at all in a manner that is conducive to a better world environment. I just wonder if there is any hope for an initiative in that way.

Mr Herman: There is more than hope. As you know, we have the federal Environmental Assessment Review Act, which most clearly applied recently in the case of the Rafferty-Alameda dam in Saskatchewan, which is basically a government law supported by detailed regulations ensuring that government projects are subject to a comprehensive environmental impact study to make sure that what the government is doing—

Mr M. C. Ray: Internally in Canada.

Mr Herman: Yes; but if I can be permitted, there is a process now under way to strengthen that act, and one of the

aspects being examined is possibly applying it to activities related to the promotion of Canadian goods and services and exports abroad.

What we are considering—and I do not think I am being premature in stating this—is how we could broach this kind of effort in the General Agreement on Tariffs and Trade, because again you are getting at the assessment of the relative costs and benefits. If we were to apply some of these very strict domestic regulations to our export activities, it could have significant economic implications. What we would like to do is see if we can encourage our major trading partners to adopt this kind of approach generally.

I could say that for some time now the Canadian International Development Agency has had very, very stringent environmental criteria applied to the assessment of all its aid projects in Third World countries.

Mr McGuigan: Mr Herman, you have very extensive experience in what must be a very, very interesting occupation attending these world conferences. Do you get any feeling that world governments or various countries around the world are pulling to make the moves that are necessary? I think back to President Carter when he was elected. He said he had two goals, neither of which he achieved. One was tax reform, and you know what has happened in the United States there. The other was to bring about an energy policy. He borrowed from somebody else, I do not know who it was, but he used the phrase “the moral equivalent of war.”

When you look at—I guess it is the easiest target—the United States, where the defence budget is \$300 billion a year, from my amateur knowledge of economics, you simply cannot continue with that \$300 billion in war materials and also put as much or an equal amount of money into changing our energy habits. There are simply not enough people and resources to do both of them. Do you sense any realization of that or any change in attitude coming?

Mr Herman: I think the change in attitude has in fact come about. Some of the policy choices are extremely difficult for governments to make. When you are talking about possibly significantly increasing the cost of a litre of gasoline and you are telling people that they possibly have to change their attitudes totally about the kinds of cars they drive, some of these questions can be very difficult politically. I think you must know that far better than I. Until there is a public sentiment that it wants these things, it is sometimes very difficult for governments to come to grips with the decisions.

I think the feeling, certainly in Canada and internationally, is that that public sentiment to do these sorts of things is now there. I think government has the responsibility to make sure they are done realistically and that the public is fully aware of what the costs of some of the major policy choices are. As I said, if you are talking about doing things like reducing emissions by 20 per cent, you are talking about taking decisions that could significantly have a social impact. I think that internationally the will is there, and it has come about very rapidly in the last few years.

1110

Mr McGuigan: That leads up to my second question and that is a reference that the OECD has predicted in those countries, of which Canada is part, a rise of 1.3 per cent energy use a year. In 15 years—my mental arithmetic is not all that good—it would be something like a 25 per cent increase com-

pounded. At the same time, our goal is 20 per cent reduction. You get a 45 per cent spread between those goals.

Going back to public attitudes and things that are happening, I know they are not happening as fast as our friends would like to seem them happen, but I see enormous developments taking place. We had people in here yesterday talking about the use of fluorescent lights in place of incandescents. I brought this evidence forth myself: The retail price of these bulbs in Canada is \$36 and the actual cost of producing them in the United States is \$2. It is not only Philips in Holland that is making these but every major electric company in the United States. The point is that these things are going to burst upon the market very shortly.

When you look around at a lot of public buildings, you will now find these in the public buildings, marquees, hotels or in the apartment building that I live in. There are a few gas-guzzler cars still on the road that only get 12 miles to the gallon, but they are rapidly disappearing. There are many developments out there that are happening that indicate to me that things are moving along. It takes a while. There is a jumping-off point. I use an example: the use of tobacco. For a long, long time we condemned tobacco, but now the use of tobacco is going down seven per cent a year. I think these things are gathering steam.

Perhaps you are not the person to answer this, but I question where they get that 1.3 per cent increase in light of developments that, as I see it, are just starting to roll.

Mr Herman: The 1.3 per cent is basically drawn from the very detailed economic analysis that has been done about the growth in our industrial activity. Populations are growing. Economic activity is growing at a certain rate. That is what the projected growth rates are really from now to 2005.

But you put your point on the problem. For Canada, if you are talking about a 20 per cent reduction from the 1988 levels that Toronto was talking about, by 2005 you are actually talking about a 45 to 50 per cent reduction. Now suppose we could, as an illustration, save 15 to 20 per cent through more energy conservation and more efficiency, going back to the kinds of things we were doing post-1973. You are talking about a 25 to 30 per cent gap there. Where is that going to come from? How are you going to cover that? It obviously will have implications for how we permit our economy to grow.

The IEA makes the point that once you start constraining economic growth you start doing away with the research and development money that is essential to helping you solve the problem. You constrain industries so that they are no longer interested in making the investment in the new technologies that are more efficient. These are the questions that have to be addressed.

The Chair: We may want to, at some point, continue the debate just on this issue relating to stabilization or reduction. That may well become a part of our discussions.

Mr Pollock: Mr Herman, we have seen all kinds of graphs here indicating the global warming, graphs indicating the increase in CO₂, graphs indicating a methane increase and we have witnessed this. You have talked about all these conferences that we are about to have or have had. Yet, on the other hand, apparently we have had all kinds of problems like the Sahara desert, which has been a problem for years and years and absolutely nothing has been done. We hear that the Brazilian rain forest is being cut down and I do not think anything is really being done about that. We are talking about it.

Do you see any conclusions coming from all these conferences that we are having? I know that is a loaded question.

Mr Herman: As I said, the revolution in thinking on these issues has happened very, very rapidly. The first two key conferences on climate change, which took place at Villach in Austria and at Bellagio in Italy, only took place in 1987. I think if you consider that we are just a little bit more than two years from there, there has been a tremendous amount that has been done in that short period of time.

But as I say, there are still differences of view. Do we have a problem? Some say we do not. Some say this is cyclical in nature. If we do have a problem, how serious is it? There are different views. That is why you have this huge effort that has been mounted to try to look at these questions.

In the Third World, countries like Brazil look at Canada and at the United Kingdom and the United States and they say: "Well, you cut down your forests and now you're telling us that because we need more room for our growing population and we want to build towns and factories, we have to stop cutting down our forests. That is just not acceptable to us." This is why I think you are talking more and more about this question of greenhouse sinks and, that is, perhaps to allow Brazil to grow and cut down some of its forests. Countries like Canada and the United States could agree to put much more money than has now been put into reforesting some of our land.

Mr Kerrio: I am afraid they will just cut that at budget time.

Mr Cureatz: Well, we will see in the election campaign this fall.

Mr Pollock: Yes. I want to compliment you on your comments about the issue of industrialized nations dumping garbage on Third World countries, because we have the same situation right here in Ontario, where Metropolitan Toronto wants to dump its garbage down in Marmora and Lake townships. It is a major concern to me.

Mr Cureatz: Yes. How about Newcastle?

Mr Pollock: I do not hear any of the government members saying anything about that. I found that very interesting.

The Chair: I would like to add one final question. I know we have gone overtime on this presentation, but one of our colleagues who is not here today has raised the issue of GATT negotiations through these hearings and the United States's stance on intellectual property protection. I wonder if your division of the Department of External Affairs and International Trade indeed participates in those kinds of discussions and if you would see, for instance, those negotiations as part of the international co-operation on climate change issues.

Mr Herman: They are very much a part because, as I say, one of the key objectives of the Third World countries is to have access to technology. They have quite consistently said that it must be on noncommercial terms: The questions of intellectual property and patent rights must be set aside. The industrialized countries have said, of course, that that is not acceptable. There is only so much that governments can do in telling industry what sorts of things it can or cannot do. You cannot just cast aside the concept of intellectual property and patent rights. In fact, the only way that private industry can be encouraged to make sometimes the huge investment required to produce new technologies is if they know that there is some profit margin for them.

If I could use just one small example on this question of the Montreal protocol to phase out ozone-depleting substances, which I have been working on, the developing countries in these negotiations have accepted that there is a place for intellectual property and patent rights and that they cannot just be done away with.

The United Nations environment program and the World Intellectual Property Organization have set up a working group to examine what the implications of intellectual property and patent rights are. Under the Montreal protocol, we are talking about the industrialized countries setting up a fund to pay the incremental costs that would be incurred by the developing countries to move to new technologies that would free them from this dependence on ozone-depleting substances. One of the issues we are discussing is: Could you take money from that fund and pay it to industry in industrialized countries to allow them to give up their technologies, taking into account what their investment and their expected profit margin have been over a certain period of time?

These are the sorts of things we are looking at. It really does not get into a question of the GATT except on the intellectual property side. Companies just will not do what they must do in terms of bringing on stream the new technologies unless they are assured over intellectual property and patent rights.

The Chair: This has been a useful and interesting presentation to the committee. As you can tell from the list of questioners, there is a lot of concern and interest in the areas that you have described to us. We want to thank you very much for joining us this morning and we will look forward to receiving the material that you will be sending on to us.

Mr Herman: My pleasure, and if you need anything further from us or if you want us to come back at some time, please let me know.

The Chair: We are going to take a short break, as our next presenter has slides and audio-visual equipment to set up. I would like to reconvene in five minutes.

The committee recessed at 1121.

1130

WILLIAM S. FYFE

The Chair: I am pleased to welcome our next witness, Dr William Fyfe, who is dean of science at the University of Western Ontario, as well as a professor of geology at the university. Dr Fyfe received his doctorate in chemistry from the University of Otago in New Zealand and has since held a number of teaching positions at universities in England, New Zealand and North America. His interests include geochemistry, resource development and conservation, agricultural geochemistry, environmental geochemistry and nuclear weapons disposal.

To name a few of his accomplishments, Dr Fyfe is recognized as a companion of the Order of Canada and is a fellow with the Royal Society of New Zealand, the Royal Society in the United Kingdom and the Royal Society of Canada. In addition, Dr Fyfe has edited a number of books pertaining to chemical geology and environmental geophysics. Welcome, Dr Fyfe.

Dr Fyfe: Thank you very much. It is a great pleasure to be with you and it is a great pleasure to know this committee is here. There is some slight reason for hope: People are becoming aware there is a problem. I think it is a very difficult problem.

very complex, very urgent. We somehow have to find energy for 8 to 10 billion people early next century, and this is scary.

I think also, though, that it is a great opportunity. Unlike the former speaker, I think we must lead; we must not wait for others or for international agreement. I can predict one thing for certain: Those who lead will get very rich, and I will give you one example later. We need a long view. This is what Mrs Brundtland and her committee started: the view of sustainability. It is easy to say, difficult to do.

I would also like to say, when people talk as if it is not urgent, that our world is terribly unstable socially. We have two billion people living in grinding squalor and the number is increasing very fast. We have roughly one billion people like us who get on a Boeing once a year. That is how I define rich. That world is unstable.

I come from New Zealand. Unless we change our strategy and our thinking, New Zealand and Australia will be part of Indonesia next century. There are 300 million people in Indonesia. New Zealand and Australia will disappear. Ditto Canada. Do not think nuclear weapons will keep out the refugees. There are 30 million refugees on the walk today from the environment and they blame us—correctly. Their climate is changing. Let's have no doubt about this.

I think one of the greatest environmental scientists in the world is a professor at Columbia University, Wallace Broecker. He is one of the pioneers on the greenhouse effect, how it affects oceans, how it affects our climate in Canada and so on. What he said was, "We are playing Russian roulette with the planet," and it is a very nice expression. There is no doubt about greenhouse effects. Go to Venus for the weekend if you do not believe it. The temperature on Venus is 500 degrees centigrade on the surface; a lot of CO₂. One of the great questions is could we totally destabilize planet Earth and make it take off and boil? That is not a joke.

A wonderful group is in Washington DC under Lester Brown: the Worldwatch Institute. I sincerely hope everybody has a copy under his pillow. They publish a state-of-the-world report annually. They are a wonderful organization supported mainly by philanthropic organizations. This is the report for 1990. Lester Brown, the director, says, "During 1989, politically astute national leaders sensed the mounting public concern over the environment," etc.

The United Kingdom's Prime Minister Thatcher and President Mitterrand in France all held meetings and conferences and so on. I happened to be at President Mitterrand's conference in June in Paris; about 200 world scientists were. It was fascinating, but what was most fascinating is that M. Curien, the minister for science in France, sat through three days of the meeting, all the time. I will look forward to the day when Mr Bouchard sits through a scientific meeting for three days. President Mitterrand sat through it for almost one day and gave a wonderful speech. Let's hope to God our politicians have time to look at problems.

But what Mr Brown then goes on to say is, "All in all, the initiatives were long on rhetoric and short on action," and so on and we can go on. He then says, "Only a monumental effort can reverse deterioration of the planet." His first chapter in the book, I think, is something we must take very, very seriously. It is what he calls the illusion of progress. Our economists are wrong, and he takes some examples of this that are very interesting: "As noted earlier, GNP includes depreciation of plant and equipment. It does not include soil erosion." And, my God, go to China, around Beijing, or southern India, and look at the water-table falling as they overpump for agriculture. This must

be put in the GNP. As Brown and Co show, there are many countries that allegedly have growth, but in fact are doing nothing but growing disaster, and this is not a joke. I think it is very serious.

Jesus Christ was born, we think, about 2,000 years ago, and the world had 200 million. After Christ, it took 1,500 years to double the population to 400 million—1,500 years. The last doubling—this is an old slide from the Globe and Mail; we are now over five billion—was in 37 years. Ninety million more a year. Near my home country, Java had five million in 1900 and has 95 million now. The population of the Arabian peninsula doubled in the last 12 years.

It is real. This is the beach in Rio. There were one million people on Copacabana that day. And if you know Rio, you know you cannot leave your shoes on the beach; they will be stolen. Most of these people come from the slums. There are real problems in the world, and the life-guards now carry Uzi machine guns. Rio has 400 murders a month.

But getting back to energy, which is your committee, this is the intriguing sort of curve. This one indicator, life expectancy, longevity, is almost a linear function of energy production. Everything we do is related to energy: our holiday in Florida, our hospital, our university, our school. The world problem is, how do we bring this up? You cannot live in a world with two to three billion people near starvation. It will not last.

For a long time, people thought that nuclear might do it. Maybe it will. But then we had things like Chernobyl, and that is Russian for catastrophe. That turned a lot of people off nuclear and put them on to fossil fuel. If you like fossil fuel, go to China, which mines most of the world's coal today. That is downtown Tianjin on a clear day, and everybody spits nonstop because there is no sky; it is nothing but dust. The hotels have buckets for you to spit in. I thought they were big ashtrays, but they are not. They empty them frequently. Everybody has lung disease. That was the view from my hotel window. Everything is coal-fired. Technology of 200 years ago. Disaster.

You have seen all the carbon dioxide curves. That is the South Pole. This is up north. The thing that is important is that the rate of rise of CO₂ is accelerating. It broke all the records last year. In the Amazon, 8.4 million hectares burned last year; in Canada, 6.4 million hectares burned last year. We are just the same.

We know what is happening to ozone, and we know we can get rid of that if we wish, and I just point out that the British have now brought out a propane refrigerator, which is on sale in Europe now. You do not need freons. They are using propane; they used to use liquid ammonia. The problem is nonexistent. The other thing I want to point out is that the ozone hole over Antarctica beats all the records this year and has now spread over New Zealand and Argentina. If you do not believe in ultraviolet and the ozone screen, visit Mars. Mars does not have an ultraviolet screen, and that is why Mars looks like that.

I think you have been talking about methane. It is now 25 per cent of the greenhouse effect, and methane is rising. We would be much better off to take the Globe and Mail and burn it on the street than put it in the landfill, because in the atmosphere it makes CO₂, whence came the tree, and you put it in the landfill and make methane. West Germany now has outlawed landfills.

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People say, "Is there a greenhouse effect?" It keeps being argued about. No argument. They just do not look at the right time scale. The way to get the time scale is to look at what sat

on top of Toronto, and London, Ontario 18,000 years ago when we had a three-kilometre ice sheet on top of us. That ice collected fossil air. There was a big volcano that blew off somewhere; that is from Greenland. So the Russians did a fantastic experiment. They went to the south pole, drilled through the oldest ice and brought back ice 160,000 years old with a sample of atmosphere.

Then they did a wonderful thing. They gave their ice cores to the French, who are much better chemists, and the French did 160,000 years of global temperature versus carbon dioxide in the atmosphere. No debate. When the CO₂ is high, the temperature is high. It can swing, we now know, 10 to 12 degrees centigrade in less than 100 years, and has done so in Canada before.

This is from a German newspaper: "My Friend, the Forest is Dead. Acid Rain." Totally unnecessary. It is easy to stop, by simply saying, "If you continue to pollute, we will close you down." It has stopped in most of western Europe.

You have seen this before, I am sure. That is the best global temperature record, more or less one degree, but what we forget is that the oscillations are getting much bigger. In the last 10 years, we have broken all the records. It is the high temperature that kills the tree and the old human. The oscillations are growing.

The people sit in Boulder, Colorado, with the big Cray computers and predict what the climate is going to do. The Russians are happy; Siberia warms up 10 degrees. Toronto warms up four degrees. The South Pole warms up 10 to 12 degrees. The sea level will start rising. Sell your real estate in Florida if that is true. If we melt the polar ice caps, the sea level rises 80 metres.

Do we need some more cars? Are you willing to take the risk? What is the cost of the greenhouse? What is the cost of doing nothing? For Canada, the alarming one is rainfall.

This was the 1989 prediction on what would happen to rainfall. The whole of central Canada dries up 30 to 50 per cent. There is no more farming in Canada. We are marginal in Alberta and Saskatchewan now. Finished. China dries up, God help us. India and Bangladesh, because of the Himalayas, disappear into the Indian Ocean. This is the crisis. This may not be right; we all know that. But everything happening is on track.

I was at a meeting the other day in Ottawa with our climate experts, and they are now beginning to accept this more and more. Are we willing to take the risk of stopping all wheat and corn farming in Canada because we like a ton of metal strapped on our backside to go to the supermarket? We are rich; we can buy the nectarines from Chile, but remember the two billion people who cannot.

This is from the French: "The Phantoms of the Sudan." The Sudan has had droughts just like Ethiopia—and we had the Ethiopians back on the box last night—but this is much worse than Ethiopia. There are bad seasons, climate changes, bad harvests and then civil war, the normal pattern, and the 40,000 children under five who die every day because of malnutrition and starvation. Some of them I know are coming into our schools now in Toronto. As one teacher from one of the York school boards, where she has 28 native languages in the school and now Somali, told me: "The kids don't know how to share. He does not share."

I think all Canadians should have this under their pillow. The French journal *La Recherche* recently summarized world energy consumption. Per capita we are now the dirtiest people in the world, the highest energy users and the biggest garbage producers in the world, and that is why the Third World looks at Canada and says, "Ugh."

The dirtiest country in the world for greenhouse gas is East Germany, number two is the United States, number three Czechoslovakia and number four is Canada. All the clever people who are getting richer are way down here. If we do not get more careful, we are going to be out of world trade. I am serious. The cleanest are getting the richest.

Incidentally, we should go back. If you are a Brazilian or a Chinese and you look at that graph from the American Chemical Society, you say, "Don't you tell me to clean my environment." We have to do it here or we will lose all moral right to be nice to people here.

How often are the clouds real? The crazy things we are doing: The World Bank puts a big dam into the Amazon in Brazil, the biggest river dam in the world with a lake 200-and-something kilometres long behind it, and the engineers did such a super job that it has run out of water in the summer.

Take the Amazon jungle, which to me is just a geographic, ecological organism this is what he said, not "organism". They bought \$30 million worth of chainsaws and they did not have time to cut the trees in the lake. So they drowned the whole bloody lot and now it produces methane. It is now one of the biggest methane producers in the world. The waste is just not believable. These are giant magnificent hardwoods. The young lady at the bottom is a schoolteacher from Kitchener. She said, "I want to go with you to see this thing."

Those are cattle tracks. There are sand dunes in the Amazon. These are the new towns. Near that dam used to be 3,000. There are now 500,000. The jungle burns for hundreds of miles.

Surprises: The biggest iceberg fell off Antarctica two years ago. It is 120 kilometres long. It is very difficult to push it off the oil rigs at high latitudes.

The British notice that the height of waves in the Atlantic Ocean has increased 30 per cent since 1960. There used to be an average two-metre amplitude in the waves. Now it is three metres, and eventually this will break the supertankers in half. Hurricane Gilbert had the highest velocity winds ever recorded and Britain and Europe are being hit by winds they have never seen before.

You cannot lie any more, as Mrs Brundtland says. I can look in your backyard with a satellite and the Pacific Ocean is over on the left and that is the Amazon basin from a French satellite and those are the fire trails. There is no doubt where the clouds are coming from.

This is India. If you want coal, we have a project through the International Development Research Centre with India, and it is just beyond conception. They are burning coal with 60 per cent ash and those are the ash clouds. That is a clear day, incidentally. This was just before Christmas and this is the stuff coming out of the coal plants. That used to be a river.

Mr McGuigan: Where was that taken?

Dr Fyfe: South of Calcutta at a place called Korba, which is one of the biggest power producers in India, also funded through the World Bank. It is a disaster.

That is a local plant trying to grow. Can you imagine what the lands of the local people look like? Of course, downtown Bombay on a clear day is not believable.

That is just one of the particles coming out of the power plants. I could show you hundreds. We are working on them. These things are less than a millionth of a centimetre in size. They float in the air and some of them will end up in Canadian Arctic haze.

We are terribly worried about soil, how long it takes to make soil and destroy it. We are working in Hawaii because it has got nice fresh rocks. Northern Thailand: all the trees cut just like Canada so the Japanese can sell tropical hardwoods. Then they get floods they have not had for 2,000 years up in the north of Thailand and the paddy fields look just like the rivers; they are all mud. I love the little picture a Thai farmer gave me. Hill country: They have cut the trees, planted beans, each little bean had its first leaf, down came the rain and each little bean was sitting on a pillar of soil and they had lost six inches of soil in one rainstorm. Five hundred years to put that back again.

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This is Iowa. The reason the farmers in Iowa are going upside down is they have lost half their soil. This is well recorded. This is North Africa, which in the Sahel not long ago, this was forest. That is a big tree. That is a picture of Saskatchewan in 2030.

Now, if we want to talk about Ontario, all economists should be shown a tree ring. Why did the tree not grow that year? Why did it not grow this year? Why in 1988 did the United States have a deficit of corn and wheat, which shocked even the Americans? The world food reserve is now about 30 days. We kill one per cent of all living species every year. We have killed half the elephants, and I like elephants. I think we need them for our sanity and we need things like that. I will try and wrap up very fast.

Energy: We have lots of alternatives. Hydro energy is very, very limited to the world and the impact from hydro development can be enormous, as it is in Brazil, and it is a global impact. Nuclear: The world is 17 per cent nuclear electric now, with Japan and France leading. Lovely things happen. The Swiss buy the excess French capacity to pump the water back up into the hydro dams in Switzerland from the Swiss nuclear power plants. Do not tell me it is not cheap. Fusion energy: I will be surprised if the first fusion reactor is not built early next century, and if we believe everything we think we know, it is infinitely safer, but we still must dispose of wastes.

Fossil carbon: oil, gas and coal. I think, will be impossible fuels unless you assume the world will continue to be a few rich and all the rest slaves. It is impossible. Countries like China and India cannot develop their economies on coal, oil and gas by present technologies, and I emphasize it. We are doing a set of experiments right now to see if we can remove the CO₂ emissions from coal burning. The experiments will be finished in about one month's time and if they work, it might be very exciting.

Things like acid rain are trivial; you can stop them if you want to. Solar biomass: Brazil led the world with sugar to alcohol—total disaster. They are now importing alcohol. If you use biomass you go into competition with food and soil. We lose soil one per cent a year and we have two billion people starving of malnutrition. Biomass is not interesting until the world feeds itself.

Geothermal: My home country, New Zealand, produces a lot of electricity from volcanoes; but then there is cool geothermal. If I drill a hole under our feet here, the temperature is roughly 30 degrees centigrade when I get down one kilometre. I can take you into a new town in Sweden where the entire town is heated from two drill holes in the ground. Canada has the best drilling people in the world and very good geophysics. We could do all the domestic heating of Canada from drill holes. It is very clean, incidentally.

Solar electric is moving extremely fast. The Boeing Corp of Seattle, working on power systems for satellites—and I think this is one of the most exciting things in the world—now has solar electric cells 37 per cent efficient; 37 per cent just announced. This could change the world. There is no reason at all to think of coal, oil and gas for India. This is the solar energy map from the French, of the world. If Boeing is correct, and incidentally, the materials are simple, there is hope in the world.

Energy storage; no problem. Take your excess electricity and make hydrogen, like Mercedes-Benz is doing. Remember in Washington a few months ago they had the ceramic engine hydrogen-fuelled Mercedes-Benz outside the environmental conference in Washington, DC, and you can buy one in Sweden from Saab. People are looking at the future.

For Canada, conservation; we produce far too much energy. If I was the dictator of Ontario, I would freeze all new energy production for 30 years. We could learn to walk. We could develop true sustainable urban planning, not the disaster of the Los Angeles syndrome being reproduced in Toronto and London, Ontario. We could even have railways, and do not tell me our federal government has any idea about the environment.

My trip here this morning was a perfect example. I drive a car to London airport, I fly a plane to Toronto, the plane cannot come into the terminal so a bus comes and picks up. I then get a limousine and come here. There is no place in Europe I would not have done that trip, downtown to downtown, 100 miles, in 45 minutes. The Europeans will soon have the greatest train system in the world, all electric. I was in Germany in June—they must have been prophetic—and there at Hanover was the new overhead—I mean above-ground—super railway going to Berlin from Frankfurt being built. I must have known Germany was going to unite. We could just go on and on.

Canada must learn to conserve and I think we can. I think my great reason for hope is our school kids. I had a big debate in some of the Ottawa schools. The plastic cups have all gone. When you say to an average child, "What would you do if I saved you \$500 by being rational about energy?" the kids are full of great ideas.

We need new economics. Development needs to be integrated on something like a 50- to 100-year time scale. Countries are learning this slowly. It is called holistic economics. You integrate the entire track. You do not leave the soil out of the agricultural calculation; you do not leave the ground water out of the irrigation calculation, etc. We need to integrate our environmental impact and what it does on population. The developments I showed you in India have done nothing but make everything worse, because it has led to population increase that is not sustainable. Let us talk to the Pope, more honestly.

More and more I just think we have to cut out waste; waste is the economic killer. The reason we have not as much money to invest as the Europeans in development is we waste. Talk about small cars, do we need small cars? I was in Portugal a while ago. The new car built by Honda, and Rover of Britain, with an 1100cc engine is magnificent, just magnificent. We have got to stop chucking our money down the tube.

I came into Toronto a few days ago. It was 10 o'clock in the morning, the sun was shining, and all the freeway lights were on. This morning, of course, around the SkyDome all the floodlights were on at 10 o'clock. If we had one ounce of intelligence, that electricity would be making hydrogen, a clean fuel. I should add, coming into this building, a big Jaguar drove up and an impressive looking gentleman got out of the Jaguar to come into the building. The driver of the Jaguar had parked it

right at the front door, sitting in the Jaguar, with the engine running. We are insane.

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I always think of the words of Aldous Huxley, a man I love, how economic policy has been based on three words: greed, violence and incomprehension. I think it is time it stopped. I like the words of Jacques Cousteau and I think it came up with our former speaker: Yes, think globally, but act locally and act individually because every time you save energy you are richer. This may not suit Ontario Hydro entirely, because you may spend the money you save in the liquor store, but it will be spread around, even the flower store or the bookstore.

The philosophy of "Let the next generation pay" is no longer true. The clean are getting richer and the countries using the least energy are succeeding economically in development.

Another argument put forward is you cannot move a super-tanker quickly, people will not change quickly. Nonsense. If you do not believe it, take a look at eastern Europe in the last six months. Who the hell would have believed what has happened? We could go back to our world in 1938 and what they were doing in 1940, when we switched in six months to a war economy and changed everything. We actually did not get poorer because of it, strangely.

I think we have an equal crisis today and I think we have a job to be leaders and not wait for the world to make up its mind what it is going to do. I think we are the richest people in the world because we have that.

The Chair: I have a list of questioners, beginning with Mrs Grier.

Mrs Grier: I do not know how to start, Dr Fyfe, you are so compelling and so wonderful in how you describe it; on the other hand, so depressing about the prospects for in fact doing anything.

If I were to accept—I am a democratic socialist, so I am not sure I can—that greed is the primary motivation, that the rapid changes you talked about from 1938 to 1940 and even what is happening in eastern Europe are motivated by self-interest, how do we get across to people in Canada, in Ontario, if we cannot have you go and speak to every single small grouping, that it is in their own self-interest to do this?

Dr Fyfe: I think there is no doubt step one is for people to be aware of what is happening in the world, true awareness. Very difficult to convey unless people go to that world. That is why we have been taking school teachers to Brazil and things like that.

Strangely, I find when I am talking to high school kids, and even smaller ones, self-interest in the end works. He quite rapidly, and in New Zealand or Australia maybe even more, is aware that if he does not help these other people he is just not going to have his country any more. So self-interest gets down to a very national priority.

But then with the other people—for example, we cut the heating bills in our house 50 per cent by putting in independent room heating, which is very cheap. We also own a small car. That gives me \$1,000 a year more in Canada. Then you say, "What would you really like to do with \$1,000?" That is self-interest, if you like.

The other thing, conservation, lowering energy use, creates employment. At the University of Western Ontario there is hardly a thermal pane of glass in the whole university, most of them are single panes—illegal in Sweden. If we brought in that

law you would immediately create employment for lots of people who make windows and put them in.

Everybody saves money. Where does the money come from? Because you cut your energy consumption 50 per cent, you reduce pollution. I think you can show hands down that you make money by being clean, make a lot of money.

Mr Callahan: A couple of things. You have showed us the chart and you pointed to France and Japan as being cleaner—

Dr Fyfe: Per capita.

Mr Callahan: —and making money. I got the impression that they are highly nuclear and I got the impression that maybe you were supporting nuclear over other forms of—

Dr Fyfe: It is a very interesting thing. When you look at that diagram—this was American Chemical Society last year—you pick up two countries doing very well in the world: Japan and France. In other words, the two leading nuclear countries are doing very well economically and they can claim, "We are the cleanest people in western society."

Mr Callahan: But does that mean that the logic is that nuclear is the way to go?

Dr Fyfe: I leave that to you.

Mr Callahan: All right. I just thought I would throw that one out to you because I got that impression.

Dr Fyfe: This is an absolutely reasonable deduction you have made. As you well know, there are some very strong groups, particularly in Britain at the moment, that are putting this forward all the time; that the way for the west to change its ways is to go nuclear.

Mrs Grier: If we follow through on your logic of long-term integration economics, one of the arguments we have around here is building in to the price of nuclear the ultimate price of decommissioning and disposal of waste.

Dr Fyfe: Absolutely.

Mrs Grier: Does that alter the apparent logic of the suggestion? France and Japan presumably are not doing that.

Dr Fyfe: A very interesting case is Sweden, which is 60 per cent nuclear electric. When you get your power bill in Sweden there is a bottom line: two per cent for nuclear waste disposal. They have \$30 billion invested today to decommission the reactors. Sweden has a policy: You make a mess, you pay, user pay. Dead right. We should have that as a line item on our power bills now in Ontario so people are aware of what they are doing and pay what you know is going to be required. Incidentally, Sweden has also, of course, said it is going to close all its power reactors in the next century, that they are not sustainable. The reason they are saying that is that the risk of accidents is too high.

Mr Callahan: The second thing is that we have seen from various people who have been before our committee over the last little while that the danger of increased methane is even far more dangerous than CO₂ because it absorbs a great deal more heat than CO₂.

Dr Fyfe: Yes.

Mr Callahan: Yet we have been told that there are untold natural emitters of methane: our wetlands, our rice paddies, which I found interesting. We certainly cannot just concentrate

on CO₂; we have to concentrate on the methane as well. What do you propose we do with our waste? Do you burn it or do you shoot it off into space, maybe?

Dr Fyfe: This is a very good question. At the meeting I was at in Ottawa on Saturday we had the Canadian experts and they are very good people on this, looking at the methane. We had the wetlands, we had the paddy fields, but for the first time the landfills appeared on the graph, where we put more than one billion tonnes of carbon a year. The US recycles two per cent of its paper. I have to add that when the Sunday New York Times edition is printed we cut 77,000 trees in Canada.

The first thing with waste is to not make it. This is the best piece of economics. We have to answer the question again: Why does the average Canadian produce twice the waste of the western European? Why is it that the German hausfrau goes to the supermarket with a big basket and the potatoes are not wrapped? Let's get smart.

First of all, with waste, I would say we should be able to cut our waste 50 per cent. But then with things like paper and so on, which is—it is the carbon that is the culprit. If you live in a house, as probably most of us in this room do, throw the vegetable waste under the trees. It is excellent compost. You do not even need a compost machine. It does not smell and it is good for the garden. It is what we used to do in the old days on the farm.

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The paper and stuff: Either recycle it or burn it. Do not put it in landfills, which is what the Germans are now doing. It is a fuel. The tree grew from carbon dioxide. Give it the carbon dioxide back, but make sure you plant trees.

I think our waste technology, at the moment, is engineering nonsense. Norway just put a 40 per cent tax on all commercial packaging to get rid of the nonsense packaging, and of course the pharmaceuticals lead the bunch. You have 44 pieces of paper wrapped around a bar of soap.

Again, though, I stress that we would get richer. One of the things I am proud of is that I got rid of the plastic cups at the Ottawa school board. The Coke ought to be a few cents cheaper, but you have also eliminated 25 per cent to 30 per cent of school garbage in one bang. You take your own cup to school.

Mr Pollock: A couple of things, just to comment: I am always concerned about landfills because, as I mentioned here before, they want to dump their garbage in my area and I am totally opposed to it. In fact, they even tried to take my farm to dump some of their garbage on. Anyway, it is a major concern to me.

You mentioned that some municipalities have reduced their garbage by 50 per cent. The village of Stirling claims that it has reduced its garbage by 70 per cent. I just wanted to mention that.

You mentioned drilling down into the earth to get heat. That is all right, but if everybody started to do that, that possibly might cause a problem. We have been putting rockets up into the air and now we find that in outer space there are things floating around out there, and there is getting to be quite a bit of it.

Dr Fyfe: The core of the earth is about 4000 degrees centigrade. Incidentally, that energy is produced by radioactive decay of things like uranium in the planet. The total energy available, say, in the outer three kilometres, which is easily drillable, is extremely well known. It is vast. The energy you

get out of a kilometre cube of rock at 60 degrees centigrade is just mind-boggling. You could run the city of Toronto for decades on one piece of rock. It is huge.

I think the chance that it would cause some sort of unseen catastrophe—and nobody has thought about it—I have only seen this in real operation in my own home country of New Zealand, where they drill very hot rocks. They had problems to start with and they have eliminated those now. But it is very effective and it is quite cheap.

The other one was a little town near Gothenburg, or Göteborg, in Sweden, and I was really impressed. Here is a new little town with two drill holes and the water just circulates around. In the north of Sweden, if some of you know the city of Lulea, where there is a big university, the university is entirely heated by ground water. It is clever and intelligent.

The Chair: Is there development research in geothermal technology occurring now in Canada?

Dr Fyfe: To my knowledge, there was some a few years ago. You will have an expert from the Ministry of Energy, Bunli Yang, whom I know a little bit. There was some a while ago and somebody decided it was not economical. Most of the energy, the research on what I call the cool energy, normal radiant energy, is being done in Sweden and Britain at the moment. The British have some very big projects on how to use this energy.

The Chair: In the same area of development, you have mentioned hydrogen. Certainly there was a hydrogen institute in Toronto at one time and now I understand that there is a location at the University of British Columbia and in Montreal. How effective do you understand that work to have been here, and do you see opportunity for additional development work on hydrogen in Canada?

Dr Fyfe: I am not an expert on this but it is something that interests me very much indeed. There is no doubt that when you see Mercedes and Saab developing hydrogen fuel engines built out of ceramics, they are not doing that just to make friends. The French have been doing enormous research on improved methods of using electricity to hydrogen and they want to use the excess power capacity of all their nuclear reactors to hydrogen fuel France.

I think all this is being done for very good reason indeed. I think there are enormous opportunities.

Mr Kerrio: On the same issue, as a former Minister of Energy I was somewhat involved, but the thing that took away from that hydrogen process was the very fact that it was only in the works because we were using excess electricity rather than getting into the efficiencies. When there is a breakthrough in efficiencies, I imagine that hydrogen will come into its own. What had happened to us was that because we had excess hydro power, we were using the electrolysis process, but in fact we may have been burning coal to generate the electricity to make hydrogen, which, in a sense, was not the way to go. If we develop a fuel cell, which people are working on, then this might be the ultimate fuel, but to take coal-fired stations and generate that way certainly was not the way to go.

Dr Fyfe: I think the thing that may turn this around totally is if you take a 37 per cent light electric photocell and you are living in Arizona, when you do not need any power, you just have a little electrolysis thing. Actually, I saw from Saab a little pamphlet on generating electricity from a windmill, and with a little electrolysis cell, you fuel your Saab sitting in the garage with hydrogen. There is hope in the world.

But I think this Boeing breakthrough that came out of space research, this 37 per cent, is one of the most important things that has happened in the world, because here is as close as we will ever get to clean energy.

Mr McGuigan: Just on the 37 per cent, I find that real hope. The figure I have in my mind, and I got this from plant physiologists, is that green plants, except for sugar beets and sugar cane which store carbohydrates, only use one per cent of the solar energy that falls upon them. Those are the two, and perhaps there are others that use two per cent. Does that figure agree with the figures you have in your mind?

Dr Fyfe: Yes.

Mr McGuigan: Only one per cent.

Dr Fyfe: Plants are very inefficient. It was an IBM group that made the breakthrough up to 20 per cent, but now Boeing has just—it is really quite incredible. Evidently, it is a very clever device. It is a thin film.

Mr McGuigan: And you say cheap, too.

Dr Fyfe: The materials in it are gallium, arsenic and antimony: all cheap, dirt cheap.

Mr McGuigan: But 37 per cent is just—

Dr Fyfe: What it means is that you could replace a Candu reactor. You would want a couple of square kilometres of photoelectric devices. That is getting pretty small.

Mrs Grier: In all latitudes?

Dr Fyfe: No. We would have some problems in Canada, but for the whole tropical world, countries like Africa, India, this just gets rid of those filthy coal-fired power plants. Every village from a small photofarm, a sun farm, would have its refrigeration and stuff. The food waste is one of their most dire problems. You could use it for cleaning the water. You could boil the water. That stops the child deaths.

Mr McGuigan: I should explain first that I come from an agricultural riding: Kent county in southwestern Ontario. It used to be known primarily for corn, although actually, in the last three or four years, soya bean acreage has exceeded corn. But the Ontario corn growers, along with the American corn growers, are pushing that we go into an alcohol fuel program. You mentioned Brazil. I will come to that later.

One of the kinds they make is that by adding alcohol to gasoline and, say, having 10 per cent alcohol and 90 per cent gasoline, you put more oxygen into the fuel itself—it is oxygenated—and then in the burning of that, there is less carbon dioxide. The other side of it that you already alluded to about Brazil—there are two things that I am looking at: Folks who want alcohol fuel for cars use Brazil as the example. So I hope you would give us a better scenario of what has happened in Brazil. But the other is, when you balance off those competing issues, is there enough advantage in oxygenating the fuel to offset the other things?

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Dr Fyfe: The first part: I think there is no doubt what you say. I think it is the carbon monoxide emissions that are greatly reduced by mixing alcohol into gasoline. But there are some problems and they are finding this out in Brazil, particularly in big cities like Rio where 50 per cent of the cars—

Mr McGuigan: If I can just stop you to nail down a point: Oxygenating reduces carbon monoxide, not carbon dioxide.

Dr Fyfe: Right. It reduces the carbon dioxide very little. It is carbon monoxide, which is a pretty deadly material, actually, to have.

Mr McGuigan: But is it a greenhouse gas?

Dr Fyfe: Yes. It is also better than CO₂, but also it has other nasty biological effects on everybody.

Mr McGuigan: Yes, but I am talking strictly as a greenhouse—

Dr Fyfe: No. It reduces the greenhouse a little bit, but it is not really significant. It does reduce one of the major ground-level pollutants by putting alcohol into the fuel. But what they are now finding in Rio is that there are some other compounds coming out of the tailpipes. I do not understand them all. These are things like aldehydes and things, which evidently are also not good for you. A lot of the cars in Brazil run on pure alcohol. I would say the great advantage of that is that if you have lots of food production it is a sustainable fuel, and it makes it much nicer to siphon the car petrol tank.

On the other part of your question, Brazil's trouble was bad planning. The farmers were offered guaranteed prices to grow sugar to make alcohol. So if you have a guaranteed good price, you grow sugar. The country's population is growing three per cent a year and there are 140 million of them now, and food prices have just gone through the ceiling. This has led to a real conflict. If they had said, "For every acre that goes to sugar to run the cars, we will make sure we will compensate for the food that we used to produce." Worldwatch Institute has shown this very clearly now: The food per capita in Brazil has been dropping ever since the alcohol program started and they have major problems in malnutrition. But that was bad government planning.

Mr McGuigan: Presently, according to press reports, you cannot buy the alcohol fuel. Are you saying then that food is winning out?

Dr Fyfe: Yes, but also I think they did not look—the other ingredient that goes into farming is soil and they have big soil erosion problems. Brazil had to import huge quantities of alcohol from the United States this year just to maintain its own stock, which is the last thing it expected.

Mr McGuigan: So it has been a disaster.

Dr Fyfe: Yes, but the food problem, to me, is the serious one in Brazil. The situation is bad.

The Chair: Dr Fyfe, I think that the concept of integrating environmental and social costs into economic costing is a very attractive one. Where I have always had problems in accepting that as a notion is, apart from getting the Society of Management Accountants of Ontario and so on to agree, that much of the environmental impacts are unpredictable. You have just given us a very good example of a situation where it could not have been predicted that aldehydes would have been a problem as a result of what looked like an environmentally safe and socially acceptable alternative. In the materials that I have read there is too little discussion of the unpredictability of environmental impact.

Dr Fyfe: The man I mentioned who talked about playing Russian roulette, Wally Broecker at Columbia—the new words are nonlinear surprise phenomena, like the big iceberg that fell

off. Why should the biggest iceberg ever seen fall off recently? Why the winds? I think this is absolutely true. We have to accept the fact that if things change, we are going to hit quite large surprises, which comes back to the most important thing in all development in the world: education. Educated people can deal with surprise and uneducated cannot. This is why the poor get poorer, because they cannot adapt. But I think you are completely correct: We are going to have lots of surprises.

I think that when the United States used more corn and cereals in 1988 than it grew, that was to the United States Department of Agriculture not a surprise but a shock. This was the world's breadbasket and suddenly it did not work.

Mrs Grier: When Dr Fyfe used the word "adapt," it reminded me of something I meant to ask earlier. We heard from a couple of people that climate change is happening. We can argue about what it can be attributed to, but it is happening. Really, what we have to concentrate on is adapting to meet that inevitable change. You said the rich can adapt better. That leads me to my fear that if we put all our energy on adapting, we leave the poor countries to their own devices.

Dr Fyfe: I was with an African recently from Nigeria, which is one of the crisis areas of the world, growing like mad. He said, "The world is now turning its back on us." On the news last night on Ethiopia it said that people—we had the rock concerts a few years ago. We do not produce annual rock concerts because there is a famine in Africa. We did that; that has gone, but the problem has not gone. I think it is very true. It is the poorest people on earth who will suffer the most. We know what we are saying. I think we have to do something about this.

Mr Brown: I want to come back to your original question about full-cost or social-cost accounting and putting it in. I think that is the most intriguing way to go at this problem, at least in my mind. What I am wondering is, has anybody turned the bean counters loose on this problem? Are they working at it in a way that may make some sense to all of us?

Dr Fyfe: Strangely, very little. We are trying to get a program going now. We want to take Brazil as a real test case—it is a group at the University of Western Ontario and the University of Toronto—to do what really is the "holistic approach," as the buzzwords are, to energy production in Brazil. Very little of this has been done. It is crazy.

I always ask the kids in school, "When you buy your Honda, do you realize you have contributed to Amazon deforestation?" The iron ore came out of the middle of the Amazon almost for sure. That is where Japan gets most of it from. The average person who buys a car from Japan does not realize the basic resource that made half of that car and that he has contributed to deforestation when he buys the Honda. The idea of tracking a complete development from beginning to garbage has rarely been done.

Mr Brown: This strays a bit, but one of the other things I wondered is, we have seen lots of numbers about the per capita production of carbon in Canada and particularly in Ontario. Do we have any kind of net numbers? We do have sinks. How do we rate when you talk net rather than gross?

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Dr Fyfe: The production numbers, which is what the French had in this journal, are well known, or moderately well known. Sinks are much less well known. If we take our wetlands, for example, and there is a big Canadian-American experiment going on right now, we do not know if our wetlands

are fixing carbon or emitting carbon. We do not know. What we do know is that in 1989 we burnt more forest than was ever burnt, to our knowledge, in Canada, which the Department of Forestry attributed to the dry summers two years before. It was drier than usual. So if you put that one into it, it is going bad on both sides of the equation.

Mr Brown: So we need more work is what you are saying really.

Dr Fyfe: Yes. For example, this summer of 1990 will be the first big experiment to measure the fluxes coming off all the peat bogs and swamps of Canada. It is remarkable and kind of important.

The Chair: Dr Fyfe, I have another question from Mr McGuigan and I know Mr Kerrio had one. I wonder if perhaps after this question we could adjourn for an informal lunch. We are scheduled to come back at two, but it is certainly indicative of the interest the committee has in your presentation that it is anxious to continue.

Mr McGuigan: I just wanted to point out to Dr Fyfe some unexpected results. I am a farmer in the cornbelt of south-western Ontario. Following the 1988 drought, the world decided that in spite of the drought the Americans were able to supply the reserves of grain for the world and that in spite of the drought it is a very dependable source. If we were down to a 30-day supply—we are in that neighbourhood. I think it is a little more than 30 days, but certainly it was just three years ago that we had a nine-month supply of grain on hand and we are down now to 45 days or something in that area.

Prior to 1988, the prices today would be phenomenal. They would have just been skyrocketing, but they are not. The prices are falling. The world is saying, "You came through that drought of 1988; you supplied the reserves." Of course, there have been fantastic advances in genetics and technique and so on. We are getting an unexpected result out of that.

Dr Fyfe: Worldwatch's latest report, and these are mainly US Department of Agriculture data, says that all the grain prices are now skyrocketing.

Mr McGuigan: If you look at the markets, you will find they are not.

Dr Fyfe: It is all here. In 1990 it is going up.

Mr McGuigan: You can buy the Globe and Mail and look at the grain prices. They should be double or triple what they are.

The other question was, you mentioned that when you take your copy of the Globe and Mail, you should burn it and produce carbon dioxide rather than put it in a landfill and produce methane, yet all the environmentalists out there who are driving policy—there is no question about it, these people are effective, they are driving policy—prefer landfilling to incineration. Why is that?

Dr Fyfe: Because it was not until very recently that people realized what the landfills were actually doing. They do two things: They produce methane, which nobody had measured until recently; and they contaminate ground water. "Out of sight, out of mind" is rarely a good policy with garbage. I think that is what is turning around, and it has turned around in a big way in Germany, which was one of the first. They are just not doing it any more.

Mr McGuigan: Do you see any movement here?

Dr Fyfe: It is just being talked about now. It is starting, because we are running out of landfill sites.

I cannot help adding another little one on surprise. A beautiful piece of work came out from, I think it was mainly Europeans but some North Americans, on farming. Soil has a lot of carbon.

Mr McGuigan: It used to have a lot.

Dr Fyfe: I discovered that as you use more and more fertilizers, particularly nitrogen fertilizers, it stimulates the methanogenic bacteria, and the more nitrogen you put in the fertilizer, the more methane you get out of the soil rather than carbon dioxide. That was just discovered about one year ago. So it surprised us.

Mr Kerrio: You brought something into perspective with that. It intrigues me, as a former Minister of Natural Resources—you were very kind not to talk about forestry in Ontario, but not for the reasons that I want to share with you. You suggested—and I have used those numbers that you have used many times; it is a New York Times Saturday edition—that we cut nearly 80,000 trees to print it.

Dr Fyfe: Yes.

Mr Kerrio: The Toronto Star requires just about half that number to print the Saturday edition.

The point that I want to make, I think, is reasonably valid. As a minister, I had a great deal of pressure put on me to supply to the consumer that paper for those papers, the softwood, and for building homes. We have developed a society that is totally dependent on these kinds of products everywhere we look. We have paper napkins. They do not diaper children any more with cloth; they diaper them with wood products.

Now the question that I would pose, to be a little more fair maybe in looking at the whole process, would be, when an environmentalist I respect, like Suzuki, for one, prints an article in the Toronto Star, he in a sense is using some of that print on paper. That is the very thing that he is accusing the minister of supplying. I would ask if it could be possible, and you have just touched on it, if those people who are intent on helping us clear up the problem would spend an equal amount of time appealing to the consumer as they do to the ministries that supply these products. We may get a more educated public that would say, "Yes, we can't make demands without accepting that we're going to have to cut back." That is maybe a problem that is difficult to deal with. How do we cope with that situation?

Dr Fyfe: I think it goes back to Mr Brown's comment on really doing—I mean, the magic word is "sustainable," which I think is a real word, because if we are not willing to face that, we are saying, "Let the next generation take care of it."

A little boy I had in a class in a Waterloo school, whose father obviously was in the forest industry, said, "Hey, you're

trying to put my old man out of a job." I said, "No, we're just trying to make sure that you have some trees to cut when you grow up."

I think you are completely right. If we use a commodity like wood, and it is important, it is a vital commodity, which we love—we do not want all stainless steel on the benches, and that uses energy—then we had better do our economics of sustainable use correctly. I think this is what we are moving to. If Japan can recycle 80-something per cent of its newsprint, what is the real economics, long-term in Canada, of saving that patch of forest for the kids to cut down? I mean, let's be realistic. I agree.

The other one I do not like at all—and I did not show these pictures today, because we are not in Vancouver—is that the clear-cutting of that magnificent forest to sell logs to Japan is economic. It is time we played hardball with the Japanese. "If you really want to use our forests, we'll send you a product, not a log." I mean, not a big log from Vancouver Island. This is greed, pure greed.

But I agree with you totally, and I think we can do it. I think, if you look at the very interesting country that got rich—and I admire them, because they are clever people, the Finns—it is Finland. Finland is a rich country now, and its forest industry is highly conservative, but Finland made the decision a little while ago, "We'll only sell quality forest products." If they had gone on doing what they did 40 years ago, they would have run out of trees. So they went deliberately to a high—they sell to the world more high-quality paper than anybody else.

I think we have got to start getting a bit sensible. I was in a wee Japanese village near Narita Airport in Tokyo, and here was this pile of huge trees and I said, "No way they come from Japan." The butt of one of them was stamped Canada, and I sort of walked out of this village in disgust. I think we have to start doing Brundtland's holistic sustainable economics. If it is not going to be sustainable, let's tell the people in that village, "In 20 years, you're out of work."

The Chair: Dr Fyfe, you have brought energy and your sense of urgency to the committee. A measure of the impact that you have had is that most of the committee has stayed around well past the concluding time for the morning session. We do want to thank you for being here. Some of us may be able to extend an invitation to you to join us for lunch to continue the conversation. The committee will resume at two o'clock this afternoon with representatives from the Netherlands.

Dr Fyfe: It was a great pleasure, I might say. I do not expect people to believe what I say, because it is very complicated and I keep changing my views.

The committee recessed at 1240.

AFTERNOON SITTING

The committee resumed at 1408.

ROYAL NETHERLANDS EMBASSY

The Chair: We are very pleased to welcome as our first guest presenter Dr Bert Metz, who holds the position of counsellor for health and environment at the Royal Netherlands Embassy in Washington, DC. Dr Metz received his PhD in biotechnology from Delft University of Technology in the

Netherlands in 1976. Since that time, he has lectured on chemical engineering at universities in both the Netherlands and Nigeria.

Before accepting the position with the embassy in Washington, Dr Metz also acted as the program manager of the hazardous waste enforcement program with the Netherlands Ministry of Housing and with the Inspectorate for Environmental Protection. Dr Metz has released numerous publications on

the subjects of biotechnology, the environment and development. We welcome you here. Dr Metz is accompanied by Mr Jansen from the Netherlands consulate-general in Toronto.

Dr Metz: If you will allow me, I would like to make use of the overhead projector to illustrate my remarks about the Dutch policy on global warming.

Something you probably already know is that the Netherlands is a low-lying country. About 25 per cent of the country is below sea level and 65 per cent is at risk of flooding at high sea levels during storm surges. You see the red line across the country which marks that, one metre above medium sea level. It is the area of the country where our most important population concentrations are located: Amsterdam, The Hague and Rotterdam.

Naturally, a country like the Netherlands is very vulnerable when it comes to sea-level rise as a consequence of global warming. Strange as it may seem, that is not the most important reason for concern among the Dutch population and government, because we have had a history of struggling with the sea for a couple of hundred years and we are quite comfortable that we can meet even this challenge. As we say, there might even be some interesting business opportunities around the world for us to offer our technology of building dikes.

However, there are other concerns which are more important. We will suffer, definitely, from intrusion of salt from the extensive coast into our ground water. We will probably have to face severe changes in water management due to runoff differences and different patterns of rainfall. Above all, the concern is about global instability on a great scale. We figure that if the predictions about global warming prove to be correct—there are a lot of scientific uncertainties right now—and there is a fair chance that they will turn out to be correct, that will generate severe instabilities in weather patterns and will lead to severe problems in many countries. As a small country we are very dependent on global stability and global trade. We fear we will be a major loser if this turns out to be a serious problem.

Therefore, the guiding principle of the Dutch government in setting out its policies right now is that we cannot afford to wait to do something, because although maybe the chances are still small that it will be a really serious problem, if it turns out to be serious, we have no time to waste. So the government has already set out to implement policies, things which in many cases have other benefits as well and serve other purposes. I will try to show you that. That is the main point.

I will talk about two things: first, how we are acting domestically and what our domestic policies are at this moment; and second, our international activities.

First of all, as I said, the main emphasis in our policy is on prevention. Although some degree of warming definitely will be inevitable and we will have to cope with the consequences of that, prevention strategies will enable us at least to buy time so that we will have more time to adapt to the inevitable changes, and second, we can greatly mitigate the effects of the global warming resulting after applying our policies.

As you probably have noticed, the Dutch government brought out recently a national environmental policy plan. If I am correct, the committee received a copy of this report which was issued last year. It is a comprehensive plan to address a whole range of environmental problems and it is a long-term plan. It addresses the period from now to 2010, so a period of about 20 years, and it is based on the principle of sustainable development. It is sort of our translation of what the Brundtland commission some two years ago set out as the major challenge for the world. It deals, for instance, but that is just one of the

issues, with global climate change as well as stratospheric ozone depletion.

The groundwork for this plan was laid in a scientific study and the study is called Concern for Tomorrow—a National Environmental Survey 1985-2010. You have received a summary of the report so far. I will leave a full copy with the committee clerk. This study looked at the environmental quality in the Netherlands as it would develop, based on our present policies, until the year 2010. That was one projection of what the quality of the environment would be like.

The second issue was, what should the quality of the environment be in order to guarantee a healthy economy in the Netherlands, in order to avoid passing the bill for cleanup to the next generation? When you compare those two things, you see a huge gap. Present policies will not, absolutely not, get us the required environmental quality. As soon as you have identified that gap you can specify your targets, which can be expressed, for instance, in terms of the carbon dioxide and the chlorinated fluorocarbons in terms of the required reduction percentages you need in order to get you to the required environmental quality.

Then you see these figures of about 80 per cent reduction required for CO₂. That is an estimate, but it is in that order. For CFCs it is something like 75 but closer, especially given later scientific findings, to 100 per cent.

What I did not specify on this sheet is that it also applies to things like acid rain, where we need to cut our SO₂ and NO_x emissions by 70, 80, 90 per cent, and our hydrocarbon emissions by an amount in the same order of magnitude.

You can imagine that such reduction percentages present a major political problem, because how are you going to realize those things? Some, like the 80 per cent reduction in CO₂, are absolutely impossible to realize over a 20-year period of time. So in the national policy plan, which can be seen as the political answer to the challenge put by the scientific study, political compromises were made, but they are still coming out with major reductions in various emissions.

You may have heard that we had a cabinet crisis last year. It was the first government to fall on an environmental issue. It was on this plan, but it was not on the basic approaches nor on the strategy over the targets. It was on one aspect, one element of the budget accompanying the plan. It is a major additional expenditure which will be required. I will talk about that a little bit later. There was no agreement between the then coalition partners on how to do that.

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In the meantime we had new elections in which all parties, even the party which created the cabinet crisis, said that this plan was absolutely required and that even more should be done. They have a new coalition now and the new coalition cabinet has fully supported this plan, even committed itself to going beyond this plan to vote to put more money into it and to tighten the standards to bring forward some of the deadlines.

This new environmental policy plan plus, as it is called, is being written right now. It will be released later this spring. But there are no fundamental differences of opinion, you could say, in Parliament or outside Parliament. This is the major guiding line, anyway.

I will touch briefly upon a few elements of the policies, especially as they are related to global warming. First of all, the policies on CFCs: The policy plan calls for phase-out, in line, by the way, with the European Community policy—complete phase-out of CFCs in the year 1998 and an 85 per cent reduc-

tion already in the year 1995. As you can see here on this sheet, there is a gradual decrease. The final tool to implement the phase-out will be a ban on CFC production and use.

Mr Kerrio: Excuse me. Is this your target or is this what you have achieved?

Dr Metz: This is the target. The plan was written in 1989, so there are no updated figures on 1990 yet. But all indications are that we already have achieved a drastic reduction mainly because, as I said, the end will be a ban, but until 1995 most of it will be achieved by voluntary agreement with industry. We already have such an arrangement in place with the aerosol propellant industry. It has committed itself to a 99 per cent phase-out by 1994; by mid-1989, at least for aerosols, there was an emission reduction of 80 per cent already.

We have implementation plans on the table now, which are being discussed with the various sectors of industry, to apply voluntary replacements and reductions for other applications, and they look quite promising. So we are quite confident that we can realize this phase-out, at least until 1995, by voluntary agreement. After that we will have to use legal instruments to get the complete phase-out.

A similar picture is made for halons, which are to be phased out by 1995. I will not show that to you now. Then I will touch upon the CO₂ emissions, which are a much more difficult problem.

Nowadays you can find alternatives to CFCs, so that is not too difficult. With carbon dioxides you touch immediately upon energy consumption. Now, the Netherlands is already relatively energy-efficient. I made three comparisons here between Canada and the Netherlands. Per capita, we use about half as much energy as Canadians; per unit of gross domestic product, it is about the same relationship. The only area where we are, say, the leaders is in energy used per square kilometre. That shows a little bit of the density of the Dutch country and the economy. You have a lot of activity on a small piece of land, so that creates enormous pressures on the environment.

Also, in terms of carbon emissions, the relevant indicator for contribution to global warming, the Netherlands is in sort of the European range, which is considerably lower than the United States and Canada but still somehow higher than that of Japan. Given these circumstances, it is not an easy job to cut on your energy use because that is what it in fact takes—energy use for all purposes, including transportation. That is the major contributor to CO₂, given the fact that most of our energy is fossil-fuel based. We have only a very small percentage of nuclear and virtually no other sources.

The national environmental policy plan specified a target of stabilization of CO₂ emissions in the year 2000. That was already a major commitment. It was the first country, I think, that did that. This is a graph which shows in black dots the expected trend. The second line shows what the national environmental policy plan's commitments were. But due to the further commitment of the new government, which will be reflected in the new updated version of the plan, the commitment has been brought forward to stabilization in the year 1995. When I say "stabilization," I mean stabilization at the level of 1988-89.

For comparison purposes I put in these dots here which show how things would develop until the year 2000. I must point out that the commitment only goes as far as 1995; the rest is sort of what could happen after that. If we are able to turn around our growth and get a stabilization by 1995, we will be in good shape probably, but that is no commitment to get a real net reduction by the year 2000. That is far away from, say, the

Toronto target of 20 per cent in 2005, but we think that is not possible to do, given the nature of our economy.

How are we going to achieve this? That is, of course, what it is all about. There are three sectors of the economy where most of the reductions could be achieved. These are in order of importance. First of all is energy conservation, and there are four aspects: residential heating; the use of electricity in households for appliances and lighting; all forms of energy use in industry for processing purposes; and electricity generation, where due to a shift in fuel by shifting from coal, which we use to some extent for our electricity generation, towards gas, we can reduce the amount of CO₂ released per unit of energy consumed.

The tools: Look at energy conservation as the first contribution. Tools which we are going to use are listed here, the major ones. First of all, we will use our building codes. We have done that already. We are further strengthening the insulation requirements in our building codes. We will have to regulate efficiency standards for appliances, which we have not done but we are committed to embark on that. Many subsidies were abolished after the energy crisis faded away and now are being reinstated: information consulting services to industries; matching funds to encourage research and development; I mentioned already fuel switching; and in the tax range you could stimulate certain things as well.

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One novelty which was implemented recently is a CO₂ tax. We have a CO₂ tax in place since 1 February this year, and while it is still a fairly modest package, it will generate \$100 million per year in Canadian dollars. It is a tax on fossil fuels. It is in the form of an addition to an existing environmental tax on fossil fuels but unfortunately will not, as I say, change the real price of the fuel drastically, so it will probably not have a major influence upon the use of energy yet.

The energy sector should realize about 75 per cent of the reductions we have targeted; the transportation sector would have to contribute about 20 per cent. That is a very complicated area, of course, because it is very much interconnected with human behaviour. We are embarking upon major improvements of our public transportation system by investments in our train systems. Last year our railways had a five per cent growth in their passenger-kilometre production. We are embarking upon major new investments in material and in railway lines. We are going into agreements with industry and other institutions to embark upon commuter reduction plans. We have a tradition of extensive bicycling facilities. Unfortunately, they were on the decline during the last decades, you could say, being replaced more and more by the car society. We are going to improve them again by, as I say, making specific provisions for bicycling, etc.

There are plans to go into variable toll systems, which we call road pricing. It is an idea which has caught on already in Singapore, and we hope to imitate that and in that way we could selectively impose tolls on access to congested areas that would help to move people from private vehicles into the public transportation system.

Another factor will be to shift the cost of driving your vehicle from fixed costs more into variable costs and more into the fuel instead of the cost in the form of taxes on the vehicle or road taxes, etc. The next one is reducing tax breaks for commuters. We have that in our tax system. That was in fact the element which led to the breakdown of the coalition and the cabinet crisis. The farther you live from where you work, the

higher your tax break, and it was felt to be an incentive, a wrong incentive. We are going to at least limit it and later abolish it.

Last but not least, land use planning can—and that only works in the long run, of course—contribute to better accessibility of office locations and workplaces by public transportation and reduce the need for commuting by a private vehicle.

Now this, as you have seen, is quite a comprehensive package of interrelated activities and it all boils down to a quite expensive package.

You see some figures here of expenditures for the various elements of our policies, talking about, altogether, something like 1.5 billion to 2 billion guilders. That is something like \$1 billion to \$1.3 billion Canadian. That is annual expenditure in the year 1994. From now until that year it will gradually grow, but in that year it will be about that amount, and that is only 20 per cent of our overall additional expenditure for the environment.

So we show it in a little different way. We are going to double our environmental expenditures in the year 1994, as opposed to where we are now. About 20 per cent of that package is related to global warming, and it is not only for global warming purposes, of course, because if I talk about energy conservation and changing the transportation system, it will greatly benefit acid rain emissions and a lot of other aspects. So it is benefiting more than just one problem.

Mr Callahan: You have two per cent in there for Third World. Can you explain that a little?

Dr Metz: If you allow me, I will touch upon that in the next minute or so. For time reasons, I will not talk about all the elements of the greenhouse prevention policies, nor about our very modest reforestation efforts. Adaptation is something which is only working actually in the long range, you could say. But I would like to say something about the second component of our policies, which is the international action.

For a small country like the Netherlands—for your information, we generate about one per cent of the global CO₂ emissions, far less than one per cent of emissions of methane and nitrogen and dioxides—it is impossible to solve this problem. Therefore, one of the cornerstones of our policy is to promote action internationally. Only by joint action throughout the world can these problems be addressed effectively.

There were two major initiatives the Netherlands was participating in or took on its own. The first was last year's summit in The Hague, where the Canadian Prime Minister also participated, which called for institutional reforms in the systems which we have in place to address these issues on a global scale. Our decision-making processes are not very effective and we felt, together with France and Norway, which were the other initiators of that conference, that we should address that. That led to a call to action, the declaration of The Hague.

The second initiative was the so-called Noordwijk conference which took place last November in which about 70 nations joined in a declaration which called for a stabilization of carbon dioxide emissions and immediate attention to global forestry programs leading to stopping deforestation, even to a net growth in forest area in the near future.

It also called for—and that is, I think, a very important issue—adequate funding mechanisms for the developing countries to enable them to restructure their economies. We feel, as an industrialized nation, that we are obliged to lead the way and to show that we are taking this seriously. It is inevitable that developing countries also participate, otherwise

the gains will be easily lost again. But in all honesty, we cannot ask these countries to do that unless we provide the technical means via technology transfer, as well as the finances.

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The Noordwijk declaration also contains a strong paragraph on the need for those actions, plus it calls for an international treaty, a global treaty on climate change to be signed at the latest in 1992, but hopefully somewhat earlier.

The thing I just mentioned, the need to assist developing countries, is also put into practice in our own development policies at this point. That answers the question which was put to me just a couple of minutes ago. The 130 million guilders per year for the Third World is meant for additional activities to support technology transfer, to strengthen the institutions in the developing countries themselves. They do not have the bodies, they do not have the apparatus to address these things. We think that is one of the first things you should do.

Third, it is available for something like a CFC or climate fund, an extra sum of money which can be used to take initiatives benefiting developing countries.

If you talk about extra funds, you easily get into a debate on whether to use existing channels or create new mechanisms. Unfortunately, that usually takes most of the energy in the debate, on how to do it and not what to do. But there are quite a few existing mechanisms which can and should be used. The Dutch government is strongly supporting the tropical forestry action plan as a vehicle to support better forest management policies and to stop deforestation, etc.

We have our multilateral development banks, among them the World Bank, which have great potential, but we feel that there might still be a need for additional funds because things may not be done as quickly if we do not have such a mechanism.

This is a bit of an outline I wanted to give you about the Dutch policies on global warming. As you can see, the Dutch government takes these things very seriously. I come back to the point I made at the beginning that given the risk we face if we do not act in time, the major disturbance of the world, we feel that there is no reason to wait. We should embark upon immediate action now. That will lead to financial sacrifices. As you can see from the programs in place, they have a major financial impact. To put it in other words, between now and 1994, the additional expenditures for environmental purposes in general are about US\$1,000 over that five years per person, each inhabitant of the Netherlands, 20 per cent of which is related to global warming issues. So that shows something of the willingness to commit.

My last remark is that the Dutch government is very committed to an international approach and is pursuing vigorously the signing of a global climate change treaty.

That is what I wanted to say. I am available for any questions.

The Chair: Thank you very much, Dr Metz. This is a very comprehensive document. We have some questioners.

Mrs Grier: Let me start by congratulating you and your government on the incredible efforts you are making. We have heard the argument here that because Canada is a such small contributor on a global scale to this problem—I think we contribute about two per cent and you said you contribute one per cent—it is better to wait for an international consensus and that our contribution would be so small that there is no point in forging ahead. Yet you are taking an entirely opposite approach

and being a leader in this field. Have you had that argument internally: What is the point, because our contribution is small? Or was it just a consensus that you would move fast?

Dr Metz: Yes, that argument has been made, of course. We are not that much different from the average human being, I think. But I can say that the overwhelming attitude of people is that indeed we should not wait because, first, if industrialized countries are not starting, they lose credibility to convince others to embark upon these sorts of policies.

The second point, which made it maybe a little bit easier for us, is that action to reduce CO₂ emissions almost always leads to considerable reductions in emissions of nitrogen oxides and sulphuric oxides, which are benefiting our very serious acid rain problem. Acid rain is considered to be the number one issue, so any action which contributes to alleviation of that problem is supported. In fact, in most of the policies and the strategies being embarked upon, you serve both purposes.

Mrs Grier: Another argument that is raised here is that because we are a trading nation, and largely because of our free trade agreement with the United States, we would put ourselves at an economic disadvantage to do some of the things. Yet you are operating within the European Community when you talk about energy-efficient appliances. My understanding was that you perhaps did not necessarily make your own appliances in the Netherlands; they are imported from somewhere else. Does that present special hurdles for you, and if so, how have you overcome them?

Dr Metz: Yes, there are special problems. Two remarks: First of all, the questions of course came up. What will all these environmental expenditures do to our economy in general? Will it lead to a massive loss of jobs? How will it affect our export position? We are very dependent on exports. That problem was answered by economic evaluations of the plan as a whole.

No specific studies were done on the global warming elements but some were done on the plan as a whole, and that led to the conclusion that over that 20-year period of time the expected growth of the economy could easily absorb the extra expenditures. Although there were some negative consequences for jobs and exports, they were marginal compared to the overall situation.

The second point is, what can a small country do in terms of, for instance, appliance standards? We are indeed seriously restricted by the legislation of the European Community, which does not easily allow us to set our own standards, let alone the problem that in many cases products are being made elsewhere and you can only try to control the access to your market. That is a serious concern for us and we are pushing these things very strongly in the EC, but we are facing difficulties. We may not be able or may not be allowed to use certain instruments in order to achieve what we think we have to achieve.

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Mrs Grier: Finally, could you expand a bit for me on the reasons why the 20 per cent reduction in emissions that the Toronto conference targeted—I think you said that—was going to be particularly difficult for you to reach?

Dr Metz: I think not only for us. What we did was look very seriously at how we could turn our growth in carbon dioxide emissions into a reduction, and we have found out that it is a major job to get to a stabilization in 1995. It is only five years away. You have to realize that you need time for a lot of things. Although we estimated about 15 per cent of our CO₂

emissions could be reduced, even at present energy prices, with a profit, it does not mean that they are easily realized in practice as well.

The stabilization in 1995 already means a sort of eight per cent reduction over expected trends. If you can get a few percentage points more reduction by the year 2000, you will have done very well, we think. To get from there to minus 20 per cent net, as opposed to where we are now, by the year 2005 is impossible.

Mrs Grier: On the sources of your CO₂, what is the distribution between energy production and automobiles? You may have told us that.

Dr Metz: I have the sheet: transportation 17 per cent, industrial 15 per cent, residential 18 per cent, electricity generation 23 per cent, and then there are some others.

The Chair: As a supplementary to that question, when you were preparing and costing your plans, did you calculate any benefits of developing technology or benefits from energy efficiencies that would increase your competitive position? Was that a part of your factoring?

Dr Metz: Yes, that was part of it, although I do not know enough details to tell you exactly to what extent that was put into the calculations, but there was a specific study made by our economic planning body which is available in print. I could make that available to the committee.

Mr Callahan: I am interested in the increased rail traffic in your country. Is that publicly or privately owned rail?

Dr Metz: Publicly owned.

Mr Callahan: What does it operate on?

Dr Metz: Electricity.

Mr McGuigan: For people or freight?

Dr Metz: Pardon?

Mr McGuigan: I was getting sort of an aside from my colleague. Do you use your rail for people or freight or for both?

Dr Metz: Both.

Mr Callahan: This increase that you have indicated is to overcome the CO₂ emissions, I guess, from increased use of the motor vehicle.

Dr Metz: The increase of five per cent in passenger-kilometre production of the railway system was just spontaneous; it was not forced.

Mr Callahan: Is your rail used fairly heavily?

Dr Metz: Yes.

Mr Callahan: Do most people live outside the metropolitan area?

Dr Metz: There is quite a degree of commuting, of course. The country is very small and so the density of population is great, which makes it easier to run an efficient public transportation system.

Mr Callahan: I gather that the increase in the rail was not a deliberate act due to this danger of the greenhouse effect.

Dr Metz: No. Apart from the focus on the greenhouse effect, there has been an effort to reinvigorate our public transport-

tation system because of all sorts of reasons, congestion, air pollution, etc. What you see now in this policy plan and also focusing on CO₂ is to strengthen that further, to really put in much more money and to remove obstacles for people to really make use of the public transportation system. But something in that range had been going on for some time, so the growth in the railway use, for instance, is to some extent a result of policies.

On the other hand, to be honest, it is the growth in private vehicle traffic, which has led to increasing congestion, that may have motivated people even more, instead of sitting in the car for an hour or more, to move to the train.

Mr Callahan: How do you dispose of your waste? Do you use landfills?

Dr Metz: Yes. We do landfills which are still responsible for something in the order of 50 per cent of the waste disposal.

Mr Callahan: How is the other 50 per cent disposed of?

Dr Metz: That is to a large extent incineration, plus reuse and recycling.

Mr Callahan: Recycling. You indicated that your CO₂ was one per cent.

Dr Metz: About one per cent of the global emissions.

Mr Callahan: And your methane was even less.

Dr Metz: Methane is in the order of 0.2 per cent.

Mr Callahan: All right. How do you accomplish that? You must have an awful lot of wetlands, I would think, in the Netherlands—

Dr Metz: Yes. In a sense, we have major tidal areas along our north coasts.

Mr Callahan: —which, we are told, increase concentration of methane in the atmosphere.

Dr Metz: Those wetlands that I am talking about are not major contributors.

Mr Callahan: They are not bog or anything like that.

Dr Metz: If you talk about marsh lands, which we do not have very much any more because we turned them into agricultural land, then you are right. In our case, the main contribution to methane emissions is our extensive animal husbandry industry.

Mr Callahan: Finally, how is your electricity generated, in the main?

Dr Metz: It is something like five or six per cent nuclear, and the rest is split between coal and gas.

Mr Callahan: Coal and gas. Natural gas?

Dr Metz: Natural gas, yes. We have extensive natural gas supplies.

Mr Callahan: You have not given yours away.

Dr Metz: Well, they were there, directly beneath.

Mr Kerrio: Ours were too.

Mr Callahan: That is just a comment. We gave ours away, is what we did.

Dr Metz: We are selling a lot of our gas.

Mr Callahan: No, we did not sell it. We gave it away.

Mr Cureatz: Would you like to review the last election? Am I going to have to get in a tirade with you, Mr Callahan? Remember that?

The Chair: Could we have some order, please, Mr Cureatz.

Interjections.

Mr Callahan: You are very partisan, Sam.

Mr Kerrio: Madam Chair, do we have to listen to this?

The Chair: Mr Cureatz, could we have some order, please. I would like you to spend some energy on the question in front of us, Mr Cureatz. Mr Kerrio, do you have a question, please?

Mr Kerrio: The truth will win out. In fact, I was going to raise that question myself. I was at first going to suggest that we could very well take a page out of the Netherlands book, considering that this very discussion took place this morning as to whether we should wait until there was an international agreement to take the initiatives. I feel that the committee generally felt that that might not be the way, that we should in fact take some initiatives ourselves and encourage other jurisdictions to do the same.

My first comment about your presentation is that you can be pretty proud of the initiatives that you have taken, and certainly I feel it is going to make quite an impact on this committee as to what we should be doing, considering that we are just in the throes of making that kind of decision.

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The question I was going to ask, of course, had to do with natural gas, as to whether you had your own deposits or some of it had to be imported, but you have answered the question already. I say that is to your advantage if you can make that change and use more natural gas in generating your electricity, not only for generating for the general purpose but for your transportation needs.

But basically, I seriously wanted to make the comment that we would be well advised to take a page from your book and see that those jurisdictions that would take the initiative would join hands. It seems like some of the larger players are going to be the ones that are going to be more difficult to move, for whatever reason, and that your initiative might get us started on the right path.

Of course my friend Mr Cureatz takes exception to comments made that cast any reflection on people who are making decisions in Canada, but it must be said that while the Netherlands is talking about the Third World and contributing to reforestation, within the last few days we saw initiatives where we are going to cut reforestation.

Mr Cureatz: Let's speak of places like Temagami. Shall we talk about that?

Mr Kerrio: Yes, if you like. But that is another time. It is not appropriate.

Interjections

The Chair: Could we have some order, please. Mr Cureatz, you are on the list.

Mr Cureatz: I will not go on, because it he riles me up too much, I will take up the next hour and a half, and we are here

for an energy process, not in regard to political bantering, which I did not start.

Mr Kerrio: Oh, no. We are here to discuss the situations that were presented. I am reacting to a slide that was up there, and if you want to do the same, you will have your opportunity.

The fact is that those initiatives are very, very important and we should all be looking at those initiatives in our own jurisdictions. I totally support the initiatives of the Netherlands and I commend you for it. I would hope that we would make a decision to do likewise.

Mr Pollock: During the last 45 years, I would say, there have been a lot of new Canadians who have come into my area from Holland. A lot of them actually were farmers, and very good farmers at that. They were concerned about the land and took good care of the land. I suppose possibly the reason for that was that they actually came from Holland, where land was at a premium. There was very little of it, and of course they wanted to take care of the land. I always feel that somebody who is taking care of the land is also concerned about the environment.

You mentioned in your comments your concerns about acid rain. I have some concerns about acid rain too. I know it is well documented that it is causing a certain amount of problems. But I think in some cases people have been misled to a point, for the simple reason that I have a maple bush at home. I tapped it 50 years ago. It was old then; it never got any younger. Some of the trees are dying. I think they are dying because they are old, not because of acid rain. I just accept that. In some cases people do not accept that. They say it is acid rain that is causing all the problems, and they do not seem to have the theory that a tree is a crop and it has a lifespan and therefore once that lifespan is over, you have to replant. They just seem to think that a tree stays there for ever. I just do not believe that. Do you want to comment on that?

Dr Metz: Yes. We have extensive documentation about the damage done not only to trees but also to other ecosystems, like heather, for instance, due to the acid deposition. Although it is always difficult to discriminate between the exact contributions, either through sulphur dioxides or through ammonia, which is in our country a very important factor, or even through ozone, it has been documented very convincingly, I think, that damage actually is done due to the acid deposition levels in our country. From that same research we have been able to derive standards, sort of targets, to be reached where we can be relatively certain that sort of damage will no longer occur. If you look at those standards, they relate to inevitable conclusions that you have to reduce your emissions of acid-rain-contributing substances by somewhat like 80 per cent.

Mr Pollock: The problem is that we seem to be using acid rain as a scapegoat for everything. For instance, roughly around 1981 people were saying that there were no fish in the northern part of my particular riding and that it was because of acid rain. Then four years later they said, "Oh, the reason there are no fish in there is because of overfishing," and they banned ice-fishing on at least 12 of the lakes in the northern part of my riding.

That was almost a complete turnaround of their philosophy in about four years and to a point they lost a certain amount of their credibility. What was it? Was it acid rain or was it too much fishing? They actually went back to when snowmobiles were extremely popular and they blamed the snowmobiles. I think they were reasonably right, that the snowmobiles had access to some of those northern lakes and they put just too much

fishing pressure on those northern lakes. They were fishing the fish out before they even got a chance to reproduce. To me, that was a turnaround.

You also mentioned that you had a crisis in your cabinet in Holland. We have had a crisis here in this province ever since 10 September 1987.

The Chair: Mr Pollock, I am not sure the matters that you have raised are ones which Dr Metz would like to address, given his diplomatic status.

Mr McGuigan: Dr Metz, I have been fascinated by everything you have said, but one particular item addresses a concern that I have. You talked about reducing kilometres travelled. Again referring to Ontario—but I hope perhaps you might have some reference to the Netherlands—given our vast distances in Canada, it may not be relevant, but on the other hand you are sort of an early warning system with the high population that you have and the fact that you are below sea level: In our distribution system here we pretty well have to take raw products, particularly food products, but also pulp and paper products and so on, from the hinterlands and put them on our excellent highway system, which was bequeathed to us by the Progressive Conservative Party over here, and send these items to Toronto in cardboard master containers or shipping containers. We put them on some sort of merry-go-round which then distributes them and puts them on another truck and sends them back again to where they were produced.

Of course, some of them stay in Toronto to take care of consumers here and some of them continue the journey on in the other direction. But in my view we waste a tremendous amount of energy moving those commodities to Toronto and back again. Also, we do not get the opportunity to reuse the master containers; they end up in the landfill instead of being reused. With the density of population you have, has there been any thought given to the distribution system, to trying to make savings in that distribution system?

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Dr Metz: To answer your question, I think it is better to take a somewhat wider perspective. Holland is part of Europe, specifically the European Community, and those issues are very much at the centre of the debate right now. As you may know, by the end of 1992 the European Community will hopefully have abolished the borders, so goods will move freely. That is expected to create an additional economic growth. One of the first things we will notice is increased transportation of goods. So growth percentages of about 40 per cent over a couple of years are being mentioned now in the trucking business.

Honestly, there is no immediate answer to that. We already see problems, for instance, in Austria, which is the gateway from Germany to Italy. It is the preferred passageway for trucks and trailers. Austria closed the borders for European trucks during night hours because of noise and problems in the villages along the highways.

In terms of the problem, yes, it is there. In terms of the solution, there are thoughts and plans to reinvigorate the rail system. The European Commission, which is the executive body of the European Community, has recently published some thoughts about using the railways in order to absorb much of the growth in freight transportation. They are thinking of systems whereby containers could move either on trucks or on railways, where you have a flexible system where for longer hauls the existing railway system could be used and then for final distribution additional trucking facilities would be avail-

able. But those things require new material. They require further standardization of the European railway systems, which are not standardized enough right now. There is some time to go before these thoughts could be implemented.

The Chair: I know that it is not your particular area of experience, but would you know offhand what proportion of European industry has moved to just-in-time delivery?

Dr Metz: No, I am sorry. I would not be able to give any figures on that. I know it is quite popular. The attitude of industry now is it is cheaper to store goods on the road than in the warehouse. In fact, looking at it from an environmental perspective, that is completely the wrong tendency. Unfortunately, I do not have any exact figures on that.

The Chair: Certainly that is going to be one of our major and growing factors here, that kind of industrial change.

Mr McGuigan: I am very interested in what you have to say as far as Europe is concerned. I think one of the things that would be a matter of concern is that one of these countries might become the dominant mercantile company, and then you would have products produced in Holland that go to, say, France or beyond France, and then come back again to Holland. Even though you improve your transportation system, that whole system needs to be circumvented, in my view, so that the stuff that is produced in Holland and used in Holland is distributed in Holland. That is the way things work here in Ontario. Our distances are not quite as great as in Europe, but we are shipping products 300 kilometres to a distribution point and then 300 kilometres back again to where they were produced.

Dr Metz: Yes, I am afraid we will not do much better than that because in Europe the whole tendency is towards that system. You produce where you can produce cheapest and then you move goods from one place to the next. Only if the price of transportation would go up, and that is not unthinkable, then the balance may change.

Mr Charlton: I would like to go back to the comment during your presentation when you said that you felt that it would be impossible for the Netherlands to achieve a 20 per cent reduction in CO₂ emissions by 2005. I think some of the tables you gave us perhaps tell us a bit of a story about that. So I would like to ask a couple of questions and try to elicit some comments, because essentially this committee through its work, and hopefully the government through consultation with industry and the public in Ontario, will be developing a program that is more specifically targeted to what we can accomplish here in Ontario.

For example, I notice on one of your tables that, per capita, we are consuming better than double the energy that the Dutch consume and that our emissions of CO₂ in Canada—and probably even higher in Ontario, although you do not have the specific Ontario figures here—are 35 per cent higher per capita than your start point in the Netherlands.

From our perspective, as we look at the things that we can do here to start to try to address both the environmental aspects and the greenhouse or global warming aspects of fossil fuel combustion and the ensuing emissions, are we in a reasonable position to pursue the 20 per cent reduction target?

Dr Metz: You will understand that it is difficult for me to judge what is best for you.

Mr Charlton: I am not asking you what is best for us.

Dr Metz: That is good.

Mr Charlton: Let me put the question to you in a slightly different way. If in the development of your plan in the Netherlands you had had our level of emissions per capita to play with, would the problem have been much different in terms of being able to achieve fairly substantial reductions?

Dr Metz: The only answer can be found in looking carefully at what the situation is and where you can find reductions, and that varies from country to country. In principle, if you are very wasteful with energy, so to say, you could reduce more easily than a country that is already using energy very efficiently, but the final answer can only be found by looking carefully at where the energy is being used and what the practical possibilities are for reductions. That is what we did and what probably you have to do or are doing.

Mr Charlton: I think your comments have been useful, but perhaps in your diplomatic way you can help us even just one step farther, by saying to us that because you have found the 20 per cent reduction an impossibility does not mean that we should reject it here without seriously looking at the specifics that we have to deal with.

Dr Metz: Absolutely. I can fully support that statement because it could work out to be feasible for you if you have a hard look at your possibilities of reducing energy use.

Mr Charlton: You talked a bit about efficiency. One of the other questioners asked you about efficiency of appliances and there was a comment about the fact that you import a lot of those kinds of things in the Netherlands. We have been in a fairly serious debate here around efficiency standards. For example, we are well aware that many of our appliances are substantially less efficient than many others in the world.

We know that part of the reason we consume a lot more energy in Canada and Ontario is because of climate, but we also know that another big chunk of that extra energy consumption is because of a range of inefficiencies. I am just wondering if perhaps—I know you will not have it with you—you could get us some information about some of those things from the Netherlands in terms of the kinds of energy efficiencies that exist in current appliances, household appliances, household heating systems, other things that you mention in the list of things that were looked at. They must have looked at some of those numbers in the development of the plan. Perhaps there is somebody who could just send us a package of information.

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Dr Metz: Yes. I think we will have to look at that separately, because I would not be able right now to give you—

Mr Charlton: No, I did not expect you would.

Dr Metz: —those comparative data, but I can definitely make sure you get whatever is available in our country.

Mr Charlton: One of the things that has been suggested to us, and I think will be suggested a number of times in a number of places around the world as we move through this greenhouse, global warming debate, is that nuclear generation can and should be a fairly significant part of the answer to cutting CO₂ emissions. I recall that two or three years ago there was a group of Dutch parliamentarians here in Ontario looking at our nuclear system. I believe they had also been up to talk to Swedish officials about possible purchases of uranium fuel and so on. My understanding of what was happening at that time was that, in effect, the Parliament had passed a resolution that on the one hand said it should pursue the possibility of major

nuclear facilities, but put in place in the resolution itself a number of very tough requirements that would have to be met in order to proceed with any kind of proposal at all.

One of the requirements I remember, for example, because of the waste disposal problems that you have in the Netherlands, was that they could only consider a major nuclear facility if they could find either a technology supplier or a fuel supplier that was prepared to take the radioactive waste at the end of the process. I am just wondering whatever happened with all of that and, I guess, consequently whether in your view nuclear will play any major role at all in your coming to terms with the energy and related environmental issues in the Netherlands.

Dr Metz: The present situation is that we have one and a half nuclear reactors in place. I think about five years ago there was an extensive debate about expanding our nuclear capacity, and I assume that in that framework you had the contacts you refer to. There was quite some opposition from the public against the expansion of the nuclear capability, but the government tended towards a positive decision, for a modest expansion. At that time the Chernobyl accident took place, and that completely changed the picture because immediately the political support for such a decision evaporated and it was decided to indefinitely postpone the planning for expansion of nuclear capacity. That is still the situation today. Politically speaking, nobody really wants to reopen the debate at this point.

Mr Charlton: Would it be fair to say that the same kind of public attitude exists throughout most of Europe, with perhaps the exception of France?

Dr Metz: I would say France is a markedly different case; Belgium also to some extent.

Mr Charlton: So you do not foresee nuclear playing a large role in cutting CO₂ emissions in the European industrial community?

Dr Metz: It is difficult for me to predict. I know that in the Netherlands the debate will not be reopened soon. What the European approach will be has still to emerge. I think it is clear that France has taken a completely different route, so far without major opposition or major problems.

The Chair: We have a supplementary on the last question.

Mr Callahan: I think Mr Charlton has addressed part of it. Chernobyl has created a very frightened atmosphere in terms of nuclear in Europe, and with the emergence of the things we have seen in the last two years, glasnost and perestroika and the industrialization of the formerly communist-bloc countries. That must give concern to you and other members of that community in terms of how they are going to go about creating energy if they are not going to even look at nuclear, particularly China. They probably use an awful lot of coal, I would think, which will have an impact on the CO₂.

Dr Metz: Yes. As far as China is concerned, China holds the key to a lot of the future on global climate change because if it would really grow economically to levels which we have been accustomed to, then that would lead to a massive increase in energy use, and since coal is its easiest option, that would immediately generate enormous amounts of CO₂.

In terms of the nuclear option, specifically in Europe, again it is very difficult to assess what will happen in the future. I recently read in the newspapers that the Ukrainian Soviet Socialist Republic, which is the place of the Chernobyl reactor, was inclined to close down the existing reactors.

Mr Callahan: Which could create quite a problem.

Dr Metz: It could create energy problems for the Soviet Union. I have no idea what the situation is like in that respect, but it is maybe a signal of the changing attitude in the Soviet Union towards nuclear energy. But, to summarize, for me it is impossible to give you a good picture of what the future will hold for the nuclear energy industry.

Mr Callahan: What do you pay a kilowatt-hour for electricity in the Netherlands? Is it expensive? The reason I ask that question is we have been told that if you up the cost of energy, conservation is a little easier. I just was curious.

Dr Metz: That is certainly the case, as far as I remember, but I do not live there at the moment. I think it is something like 25 Dutch cents, which is 17 or 18 dollar cents a kilowatt-hour.

Mr McGuigan: That is three times ours.

The Chair: I have some questions relating to the process that the Netherlands went through in reaching its conclusions. They are kind of three related questions. One of them was how analyses were done, and were analyses done, of the individual sectoral contributions that would be required to reduce CO₂. The second part is, what was the participation of the private sector in the assessment of the feasibility of the steps which have been outlined? Third, I see that there are some incentives and I wondered how the incentives for either efficiency, conservation or retrofit applied to the private sector. Perhaps you could further expand on those areas.

Dr Metz: As far as the analyses are concerned, they were based upon existing data on use of energy and existing studies on the conservation potential. There were no new studies done at the time the plan was being drafted. There is, however, an extensive energy conservation implementation plan in the making right now which is to be the detailed blueprint for how that should be done. In that framework, a lot of new information is being compiled. It is not available as of now.

On your second question regarding the involvement of the private sector, we have a system—a tradition, you could say—of extensive consultations with the private sector. During the process leading to the national environmental policy plan, industry was involved in various ways. We have various councils, our social and economic council and our environmental council, where all sectors of society are being represented, which give their views on these plans before they are debated by Parliament. So in that respect there is adequate representation by industry.

Last, but not least, when are we going to implement certain aspects of this plan, or even of previous plans? We are adopting a so-called target approach policy, target group approach, I must say, and we identify the recipients of certain policies, certain sectors of industry. It could be the utility industry, it could be agriculture, it could be the household, it could be the transportation sector. In drafting the plans we present the plans in a coherent way, in a comprehensive way, so they are recognizable as to what they mean for this specific sector, and then we embark on talks with organizations representing the sector—it could be trade associations, consumer organizations or other interest groups—in order to get their input on how to implement policies.

So we do not just write something from behind a government desk, but we get realistic input on what kinds of things are feasible, what the appropriate timetables are. Sometimes something is possible, if you wait a couple of years longer, because

then it would go together with our investment plans which are on the table in the specific industries and, in that way, we have been able to achieve quite some progress.

We have, for instance—I already indicated that—signed agreements with certain sectors of industry on a voluntary basis, where they accepted to take certain measures: reduce emissions, change product contents, etc. At the same time, the government then refrained from enacting legislation. Sometimes that is not done. Sometimes the government puts things down into regulations, but after extensive consultation. In that way, we think we have made considerable progress.

As far as your third question is concerned, about incentives, there are quite some instruments available already in the form of subsidies and in the form of tax incentives and that sort of thing. We are trying to expand those. They are geared to the private sector to influence decisions without imposing regulations. For instance, one good example in the residential sector was in subsidies to insulate your house. They were in place five, 10 years ago. I personally used them insulating my own house, by installing double glazing and insulation in the wall.

They were considerable. One third of the total investment was reimbursed by the government. Unfortunately they were abolished but, as I said earlier, they will be reinstated, maybe not in the same amount, but that sort of thing will be done. I hope that answers your question.

The Chair: Thank you; it does. This has been a very useful presentation. I think it gives us some hope that indeed there is action to be taken on the road ahead and that it can be done ahead of the international protocols. We thank you very much for joining us today and we look forward to the additional material you have indicated might be available to us. We really thank you very much for coming.

Dr Metz: My pleasure; thank you.

The committee recessed at 1535.

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The Chair: We are ready to reopen the hearings.

REPUBLIC OF INDONESIA

The Chair: Our next witness and guest is Mr Isnaedi who is consul and head of the mission for the Republic of Indonesia. Mr Isnaedi took office as consul and head of the mission in the Republic of Indonesia consulate in Toronto in March 1989. This assignment covers the provinces of Ontario, Manitoba, Saskatchewan and Quebec.

Mr Isnaedi started his career in 1964 in administrative work related to the construction of projects financed under the war reparation programs between Japan and Indonesia. He has gained extensive knowledge in areas such as telecommunications, shipping and other economic services, financial and technical co-operation, investment and trade.

In the area of multinational economic co-operation, Mr Isnaedi has dealt with the United Nations Industrial Development Organization, the UN environment program, the United Nations Centre for Human Settlements, or Habitat, and the Economic and Social Commission of Asia and the Pacific.

We welcome you to our session.

Mr Isnaedi: I would like, first of all, to thank all of you for inviting me to meet with you in this committee meeting. My thanks also goes to Mr Decker who has so kindly taken care of everything related to this meeting.

It is indeed a great honour for me to be together with you and inform you about the Indonesian policy and strategy regarding our natural resources and environment.

Before I begin presenting my exposé in a rather official way, please allow me to let you know that the first time I heard about environment was about 20 years ago. In Paris, at the time, there was an Indonesian scientist attached to UNESCO and my ambassador used to call him Mr Environment, I think because this scientist liked very much to talk about that matter.

I myself did not care at all about the problem because there were only a very few people in those days who felt concerned about environmental problems. Now, only 20 years after, issues regarding environment come up into public discussion almost at all times and on so many occasions. Nevertheless, I have to admit my knowledge about this question is still very limited.

As you have been aware, as diplomats in general used to be, they knew only very little about too many things. However, a Canadian friend of mine who is a scientist told me that is also the case with politicians. They generally know very many things too little.

I tend to disagree with that because there is a very distinct difference between a politician, as you are, and a diplomat. A politician cannot be pretending. The people whom they represent are watching them, and very closely. I like also to be watching them on TV. As a diplomat, let me say, especially in my case, that I can move quite at ease because the one who is supposed to be watching me lives in a very distant place from this country.

Ladies and gentlemen, after taking a few minutes of your precious time, I would like now to start with my presentation in a more official way.

Environment will be a major influence in government and business decisions over the current decade. We live in a time of constant change, but we are also the first generation to be in a position to control our future. The effects of the environment and economy on one another become increasingly significant. Environmentally sustainable economic development is the blueprint necessary to build a strong future.

Sustainable development, however, is not a fixed state of harmony. It is, rather, a process of change in which the use of resources, the direction of investment, the orientation of technological development and institutional change are made consistent with future and present needs of society.

For that reason, the Indonesian policy and strategy regarding environment are made and integrated in the overall national development programs as formulated in our five-year development plan, known as Repelita, which is now under its fifth implementation.

Laws, regulations and decisions on environmental management and protection have their sources in our 1945 Constitution, promulgated on 18 August 1945, only one day after the proclamation of Indonesian independence. The Constitution is preceded by a preamble containing a statement, among other things, of the following aims and principles:

"Indonesia's national independence shall have the state form of a republic with sovereignty vested upon the people, which shall be based upon: (1) belief in the one supreme God; (2) just and civilized humanity; (3) the unity of Indonesia; (4) democracy led by the wisdom of unanimity arising from deliberations amongst representatives, for creating a condition of (5) social justice for the whole of the people of Indonesia."

These five principles are called Pancasila. Guided and inspired by these fundamental principles, the basic aims which the Constitution is striving for are:

"To set up a government of the Indonesian state which shall protect the whole of the Indonesian people and their entire native land, to advance the general welfare of the people to develop the intellectual life of the nation and to contribute to the implementation of order in the world on the basis of freedom, peace and social justice."

This preambular statement on the principle that the government of Indonesia shall protect the whole of the Indonesian people and their entire native land may be referred to as the principle of the responsibility and obligation of the Indonesian state to protect "the Indonesian human resources and their environment."

The above-mentioned preambular provision is further defined in article 33 of the Constitution, which establishes the principle of the management of its environment resources and reads as follows, "Land and water and the natural resources therein shall be controlled by the state and shall be utilized for the greatest welfare of the people."

These constitutional provisions indicate the scope of the authority of the state and responsibility of the government and public versus private rights and obligations so as to permit the future development of environmental control and the development of environmental policy and legislation.

The principles as stated in the preamble and article 33 of the 1945 Constitution are the fundamental guidelines for the national environmental policy. The Guidelines of State Policy firmly defined that the natural resources of the country, whether on shore, in the sea or in the air, in the form of land, air, minerals, flora and fauna, including genetic resources, should be managed and utilized for the greatest possible benefit to the people. At the same time, the environment should always be preserved to produce the greatest possible advantage for development and public welfare for both present and future generations.

As the environment is a significant factor in sustaining life, a dynamic balance should be developed and maintained. Measures should be taken to protect and rehabilitate the environment and preserve the ecological balance. Thus, the quality and function of the environment can be improved for the benefit of the present and successive generations. Therefore, development should be carried out in a balanced way whereby sectoral and regional targets are achieved and the environment is preserved in the long term. The people should be shown how to adapt the environment and be instilled with the need to protect it through community activities.

The exploration, exploitation, and utilization of natural resources should be continued, utilizing appropriate means so that damage to the environment is bearable and the quality and conservation of resources and environment can be ensured. In this way development can proceed unhampered and sustained.

Programs for the implementation of the basic policy in the exploitation and utilization of natural resources and protection of environment are formulated in the five-year development plan. The plan is now entering its fifth stage.

Development process without being backed up by proper management will create deficiencies and risks in the form of destruction of the quality and function of natural resources and environment. The five-year development plan identified such deficiencies and risks as follows: (1) the destruction of the life-supporting system which is vital for human beings, both biophysically and socially; (2) the emergence of new atrocious innovations such as toxic and hazardous materials as well as biotechnical products; (3) the transfer of the burden of responsibility caused by the excesses of the development to future generations, or transfer of risk from one sector to the other as

well as from one region to the other, and (4) the defuncting of the social organization system in the society.

These deficiencies and risks are the result of interaction among the three prime factors, which are the population growth, the production growth to meet the population needs and the expansion of public institutions.

In the implementation of the fifth five-year development plan, policies in the development of natural resources and environment are directed towards the strengthening of the management system, so that the management will be made more efficient and effective. By the same token, efforts will also be taken towards the improvement of technology in waste recycling, better utilization of clean and inexpensive energy resources, especially renewable energy resources, the improvement of natural resources and environmental rehabilitation and the encouragement of public participation in preserving natural resources and the environment.

Based upon those directives, the following strategies are to be taken:

First, maintaining the balance between population growth and its environment: One of the solutions to minimize the pressure on the natural resources and the environment is by controlling the population growth and improving the quality of life. Population as a human resource in the development is influenced by the social environment. Accordingly, it is necessary to develop a balance between the growth of the population and the environment.

The second strategy would be improving the management of natural resources and the environment through the following steps:

1. Inventory and evaluation of natural resources and environment, including such activities as natural resources mapping and development of an integrated information and evaluation system.
2. Protection of forests, lands and water, including such activities as conservation of river basin ecosystems, protective forest and genetic resources.
3. Improvement of institutional capacities for natural resources and environmental management, including promotion of social participation in it.
4. Development of capabilities in meteorological and geophysical information gathering and analysis.
5. Development of coastal areas, which includes such activities as control of marine pollution, promotion of environmentally sound development of coastal communities, conservation of barrier reefs, mangroves and marine ecosystems.
6. Control of pollution, especially water pollution in the urban and settlement areas, including provision of facilities for waste disposal and waste recycling, and enhancement of the strategy of the community to deal with pollution problems.
7. Rehabilitation of critical lands and forests.

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The third strategy is surmounting contamination. To minimize the level of contamination, it is necessary to increase efficiency in processing materials in every development activity and to develop recycling technology related to that process.

Control of pollution from industrial and mining activities will be tightened. Besides, abandoned open mines will be rehabilitated by means of fertilization so that the economy in that area could be reactivated, such as for farming and reforestation.

The last one is enhancing the management system of sustainable development, together with the improvement of the related institutions, science and technology. In the framework of the implementation of the Act concerning Basic Provisions for the Management of the Living Environment and the Regulation regarding Analysis on Environmental Impact of the Development, institutional systems and procedures which will enable the enhancing of environmental activities will be improved. In this conjunction, centres for environmental studies established at universities and related institutions will be further developed and co-operation with advanced countries in environmental science, technology and management will be strengthened.

Since the launching of the first five-year development plan, Indonesia has maintained very close development co-operation with the industrialized countries within the intergovernmental group on Indonesia, or what we call IGGI, of which Canada is one of the members.

With regard to the co-operation between Canada and Indonesia in the field of environment, a significant project arrangement regarding environmental management development in Indonesia, or what we call EMDI, was established in 1983.

The purpose of the project is to expand the capabilities of Indonesian scientific, technical and management personnel for implementing environmental management in Indonesia's national and regional development. Funded by the government of Indonesia and the Canadian International Development Agency, CIDA, it is implemented jointly by the Ministry of State for Population and Environment and Dalhousie University's school for resource and environmental studies, with participation from a number of government, university, private sector and non-governmental agencies in Indonesia and Canada.

The project has as its goal to make environmental management, including social and cultural elements, integral to all aspects of development decision-making in Indonesia. Specifically, it seeks to ensure that the fifth five-year development plan will result in development with environmental, social and cultural needs of the people being explicitly recognized at the macro, program and project level in sectoral and regional aspects of development.

The tenacity of the relationship between Canada and Indonesia to cope with the environmental problems is also reflected in international forums. Both countries share similar perspectives on a number of international concerns. Both have signed the Convention on International Trade of Endangered Species, endorsed the world conservation strategy and are active participants in many of the United Nations meetings and programs.

Canada was elected a member of the World Commission on the Environment and Development; so was Indonesia. The countries were represented on the commission, respectively, by the prominent Maurice Strong of Canada and my minister, Emil Salim.

During the 44th session of the General Assembly last year, the Indonesian delegation stated that Indonesia concurs with the view that the threat of irreversible environmental destruction through escalating pollution and hazardous wastes proliferation, depletion of the ozone layer and climatic change, desertification, deforestation and other causes has now become a major global preoccupation. As a result, it has become firmly placed on the international agenda and a central concern of the international community. Scenarios of impending environmental catastrophe have been advanced, and the very survival of mankind has been called into question.

While such problems are global in scope, there is a clear division of perspective between the developed countries, which are a consequence of affluence, and those of the developing countries, which mainly stem from poverty and underdevelopment. Furthermore, the solution of these respective spheres of human environment also takes distinctive courses.

The industrialized countries have their own catalogues of environmental damage, which represent the lion's share of the global environmental problems. Indonesia therefore trusts that developed countries will assume a fair share in international co-operation for environmental protection in this respect.

On the other hand, since the major environmental problems of the developing countries are associated with poverty and underdevelopment, their solutions cannot be achieved in isolation from the eradication of poverty through growth and development. Therefore, it is vital that the environmental issue be addressed on the basis of equitably shared responsibility among all nations.

As a conclusion I would say that since its independence, Indonesia has taken the question of balancing the utilization of its natural resources and the protection of the environment as an important matter. The core of this question has been stipulated in the Constitution, and detailed legal provisions have been placed in the relevant act and regulations.

As a developing country, Indonesia is still facing tremendous obstacles in carrying out its commitment as it is stated in the Constitution, especially to advancing the general welfare of the people. For that reason, working together with other countries to cope with the need to accelerate the national development process, including development in the field of natural resources and the environment, is considered a necessity.

Indonesia considers that, to a certain extent, national issues regarding the environment are inseparable from the global one. Therefore, in protecting and preserving global environment security, the burden has to be proportionally shared among the nations of the world.

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That is the end of my exposé. Before going further, I would like to admit my very limited knowledge on this matter, especially in comparison with my colleague from the Netherlands. However, time apparently helps me, because we are already quite close to the end of the working day, and usually—especially this is my experience—the longer I listen to a speech, the more tired I would be. However, I will try to do my best to cope with the questions you might pose to me. If I can answer them, I will. If not, then maybe we will think it over to have our minister of environment visit this very beautiful city. I believe he will be in Winnipeg some time this May, as he was last year, giving a presentation at the international conference. At that time it was upon the invitation of the government of Canada. I hope this time it will be the same.

In addition, I have with me a publication which, if you would not mind, I would be more than happy to distribute to you. It is Indonesia Source Book. This book contains some information about my country, because I have found on so many occasions that my country is not very well known yet in this country in general, in comparison with others.

The Chair: Thank you very much, Mr Isnaedi. As you know, one of the things we find quite exciting about Indonesia is that it not only has taken its place on the international platform but also has at its heart and core environmental protection

policies that give it a credibility that some other nations do not have.

We have some questioners who would like to put some questions to you, starting with Mr McGuigan.

Mr McGuigan: We certainly find your constitution and the aims and goals of your country very fascinating. It must be a fantastic experience to be part of a nation that has sort of begun again after the Second World War. It is a whole new beginning for you.

I am wondering, as a citizen of the world, having lived in a very exciting place, and very lush from an environmental standpoint, growing various species of plants and animals—never having lived there, I would think it is a very easy place to live, as compared to our very tough climate. I am certainly not trying to make any excuses for our excessive use of fuel in our climate. Can you see in a broad way perhaps how you can teach us, in a new country, in a sense, with a new outlook and a new constitution, how to live and how to enjoy this world? You do not have the heating problems. You have crops that grow 12 months of the year, and a great diversity of crops, probably more than we do.

One of the things throughout this whole deal that has not been mentioned is that at the beginning of the robotic age, the computer age, one of the promises was that we would work less hours. Working less hours, we were going to produce less carbon dioxide and do less damage to the environment.

The actual fact is, we are working more hours instead of less hours in the global economy, in the competitive situation that we are in. Instead of working less and enjoying life in pursuits that do not use as much energy, we work longer. I wonder if you have any perspective, as a person from a different climate and a different country, in a sense, starting afresh. Can you tell us how you are looking at some of those items or how you are addressing those things?

Mr Isnaedi: Thank you, Mr McGuigan. I feel it is very pleasant for me to know that you have acknowledged, if I may say, the much easier life in a country like mine located in an equatorial area like that. People, to be frank, like to live also at easiness.

Mr McGuigan: They are smarter than we are.

Mr Isnaedi: They used to work less hours. But I believe that is not because they are lazy. It is more that sometimes they cannot afford to work more because of the heat. Then modern technology introduced the air-conditioner, and as a consequence, consuming energy is in the excess.

There have been, some years ago, efforts taken by several departments of not allowing, for instance, the construction of a new building without having large windows. Well, they did it. But after the minister left, they just closed the window and put the air-conditioner in. That is the way of life of our present time because of the influence of the industrialized countries again. But anyway, that is, among others, the idea of being independent. People, including the poor ones, like to have a good life. For instance, if they used to go to the rice fields or to the factories by bicycle, now they can easily afford to buy motorcycles. Then again, there is the question of spending more for energy and, as a consequence again, pollution.

That is the way of life, but that is again the Constitution, which guaranteed a better life for the people. The perspective at the present time, I would very much like to say, is that the environmental question has been one of the prime concerns among the people, down to the quite low level. It was done,

among other ways, through the encouragement of the non-governmental organizations which exist in my country, now about 400 of them, helping the government in one way or another to make the environmental and living conditions clean.

I am very proud to tell you that I, among others, was a project officer at the time for a seminar among about 17 countries in Asian regions, a seminar on the environment and human settlement. I had the opportunity to introduce to them in our program the projects right in the middle of the capital city. The capital city of Jakarta is not really a city; it is more like a big village with a tremendous amount of difficulties facing it. However, appreciation was given to us, not only by the participating countries such as Bangladesh, Sri Lanka and others but also from Hong Kong and Japan. We worked on that project, especially with the World Bank. So if I could say, that is the reason why I am stressing the importance of international co-operation, especially in the Indonesian case, the co-operation between Indonesia and the industrialized countries and the multilateral institutions such as the World Bank and the Asian Development Bank.

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You have touched upon also, Mr McGuigan, our heating problem. As I do not really catch your point, if I may say, I would rather refer to the question of fuel resources. I have mentioned in my speech the question of poverty. I myself live in a remote area of a very small island where, until these days, people were cutting trees or doing anything with the environment, with nature, just to support their living. In so many cases they could not afford having, for instance, a good stove or cooking material for that, not because they could not afford buying kerosene but just because of that. After all, getting wood from the field right around the house is much easier than that. However, it is improving. I saw it myself when I went back to my very small village before coming to Canada. Things are much improved now. I hope this answers your curiosity. I would be more than happy if you need further remarks from me.

Mr McGuigan: I want to thank you for throwing light on something that we have not really considered so far, the difference in living between warm and cold climates, and pointing out to us that air-conditioning is perhaps as big a problem with you as heating is here with us. I think that puts a new perspective on it.

I guess the other point I have in mind is, how do your politicians deal with your Constitution? It is very laudable to have such a Constitution, to make that come to reality. I guess if I can go to the other side of it, the centrally planned economies which are now undergoing a revolution, I do not suppose they ever decided in the first place that they were going to pollute their countries. It turns out that they are among the most polluted countries in the world, but I do not think they ever started out that way, or at least not with those intentions. But as politicians, in order to keep good order in their societies, they kept people working and turned a blind eye to the environment. How do you live up to your aims or how do you attempt to live up to your aims?

Mr Isnaedi: Politicians, as we are aware, are the same everywhere. They are very concerned with better living for their populations. With regard to the Constitution, besides the Constitution we have the very fundamental philosophy of life, to which I have referred in my speech. That is our philosophy of life, the Pancasila, having the aim, among others, of social justice for all the people of Indonesia. Pancasila was adopted, I

believe, five years ago, as the one and only basic political life in Indonesia.

Mr McGuigan: If I can just stop you there, I do not get the meaning of that word.

Mr Isnaedi: Pancasila is the five principles of the philosophy of life for Indonesians.

Mr McGuigan: Is it akin to religion?

Mr Isnaedi: No. It is composed of five principles. Belief in God is the first and social justice is the last. Because of that basis, all political parties—we have three political parties—have to work out their political life, have to base their political activities only on that principle. Although they are members of the religious party or the nationalist party or what we call the functional group, they are guided by that Pancasila. All matters regarding the needs of the people should always be referred to that.

For instance, very recently we were dealing with a very delicate problem; that is, deforestation, the problem of the tropical forest. If you do not mind, that is, again, how the politicians put it while pressuring the government. So the government imposed a policy to cope with this matter, forest preservation. Because of the importance of the forest to the Indonesian economy, the government introduced two measures to increase funds for reforestation. The government banned the issuing of any new licences for the manufacture of plywood, for instance. The method of increasing funds for reforestation is first in the form of export tax on some timber. The second one is in the reforestation fee.

We hope that by the year 1994 the amount of around \$1.5 billion could be collected so that 1.5 million hectares of forest area could be created. That is only a very small example of how the politicians put pressure on the government to take care of the interests of the people.

1630

The second one, for instance: For many years Indonesia has been a net importer of rice and rice is our main food. I recall very clearly how difficult it was at the time to cope with that problem. The representatives of the people insisted that the government pay very special attention to the problem of food sufficiency. It so happened that efforts were made and concentrated on that and as a result, by 1984-85 we were not only self-sufficient in food but we have already started to export our rice.

Again, there are some things that arise in the daily lives of the people that we use to get back to the Constitution and to the principles of the Pancasila. Again, no party can separate its political life from them.

The Chair: I wanted to ask you whether you could expand on some of the remarks you made relating to the international protocols which are being developed relating to climate change, and the position of the developing nations, which I understand is shared not only by your country but many others and relates to the proportional sharing of obligation in the context of the contribution of current carbon dioxide emissions, by example. Could you expand on what the position of the developing countries is and where you see some incentives from the developed and industrialized nations that would assist developing nations in those regards? I am thinking of technology transfer and so on.

Mr Isnaedi: This is really a very tricky question from you, especially when you refer to proportional sharing. How should we determine it? A professor, a very close friend of mine, also asked me about that question and instead of giving my answer, I asked him to give me his answer, and he could not. Apparently, even in the world forum we do not have a really clear idea right now on how we could distribute the share proportionately.

However, with regard to what we call the warming up of the global atmosphere, we have enacted a regulation, what we call the analysis of the effect of the development. Consequently there would be no project, no activities in the economy, and industry especially, that could be taken by the government as well as by the private sector without having a description of that analysis.

The government will not issue its permission if the company cannot prove that the portion of environmental preservation is included in the project. In the Intergovernmental Group on Indonesia meeting three years ago, the environment and environmental impact analysis were made the major topics of discussion. This is the idea of that. When the industrialized countries, members of the IGGI, worked together with us they insisted that we take care of environmental problems. Then we discussed that matter in Amsterdam, sometimes in Rotterdam, in the Netherlands, because there is this question, and then we posed to them the question of how to help us with that.

As a matter of fact, countries such as the Netherlands are giving a special allocation on top of the usual cost of the project to cope with the environmental problem. That is the case with Indonesia. Bilaterally, we can do it in quite a harmonious way.

But if we talk about this problem in a global context, I believe, and I agree with you, that it is not a very easy problem. For instance, only several nights ago I watched on television the living conditions in Africa. They just cut the trees to feed the cattle; that is their desertification. Who would be responsible for that? The African government, as we know, is less than able to do that. The other countries, the Europeans, the former masters, for instance, say, "Well, we are not doing that." So if we are aware, if we are in the international conference in Nairobi or in New York, I find this question of cost-sharing of the environmental problem is more, I do not want to say lip-service, but it is only a small theory right now.

I believe the better way to deal with that is to do it as far as we can in the way in which we have had the experience. As I have mentioned, with Canada we have Canadian assistance in improving our environmental management system. We have many post-graduate students continuing their studies in Toronto and in Guelph as well on the environment. We receive experts from Canada to work together with our scientists in Indonesia. There are many of them.

I believe, instead of talking more globally—I am not against the global theory—in working it out in a more practical and pragmatic way, based on bilateral co-operation. On a case-by-case basis it might be more effective.

Mrs Grier: I found your presentation very interesting, and this fascinating source book that you have given us shows just how progressive a country Indonesia is and sparks some interesting thoughts. Does the global warming, or do the climate change problems that we are discussing impact upon the general population of Indonesia at all? Are people aware of it or is it entirely a theoretical discussion that is of greater impact on other nations?

Mr Isnaedi: The question of global warming has been introduced to the people through mass media, especially when the

Bhopal accident arose, for instance. We are not very far from India. People were very concerned, and then support articles appeared in the newspaper and comments upon comments appeared on the TV, especially expressing the concern of the general public about the very rapid growth of the presence of the multinational industries in my country in the form of many factories, cement factories, petrochemical industries, etc. Therefore, again, because of that, we imposed a regulation obliging the industries to present the government with an analysis of the environmental impact.

With regard to global warming, we are of the belief that the global warming is caused mainly by the industrialized countries. We are suffering the impact of that, mostly.

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Mrs Grier: In what way?

Mr Isnaedi: In one and other ways, say, for instance, when we were informed that the hole in our ozone layer is as big as the continent of America. We said, "No, it is not fair at all any more, because, if the hole is that big, we will also suffer." People at the time, especially students, intellectuals and the general public, say, "Let's not have American investments," but we need the investment. People say, "Well, why should we have Union Carbide," for instance. Union Carbide had difficulties at the time in facing the problem in Indonesia, and so it was with the others.

Mrs Grier: I see from your source book that while you are attempting to diversify your sources of energy away from oil, the choice that appears to be made is towards coal, even though you also tell me that you have enough geothermal power to supply the entire nation. On what basis would the choice be made to go from oil to coal as opposed to something more environmentally benign, such as geothermal?

Mr Isnaedi: This is a very interesting case. We deviated, if I may say, our thinking to coal at a time when the price of oil is very high. We wanted to get more foreign exchange earning at the time by selling our petroleum products as much as possible. When the price reached around \$34 per barrel, we made it. For that reason, I can tell you very frankly, we made use of that occasion by, among other things, if we can afford it, purchasing the houses for our ambassadors, for our offices and homes, because we expected at the time a very rapid increase of the price of housing, including in Toronto, for instance. We purchased five years ago; the price has now come up about five times.

Mrs Grier: Do not tell us.

Mr Isnaedi: Then all of a sudden, we face the dilemma of the downturn of the price of oil while we have to continue developing our coal. Now what we are expecting is that the coal will not only be for domestic consumption but also for export.

Again, one very important and interesting aspect of this is that when we were about to start improving the existing coal mining in South Sumatra, I would like to tell you that it was Canada that came to us the first, before the other countries, negotiating with us and expressing its readiness and capability of financing and doing that. It was in the late 1970s, 1979 or so.

The cost of that activity would at that time have been around \$1.6 billion. I was in Ottawa and my government said it rather did not believe the seriousness of Canada. But I said, "There they are," and then we received the delegation from Indonesia to talk with the Canadian side. They said, "Yes, we are capable of doing that." So at the time, among others, it was

Canada that was going to us to try to work together with us in developing our coal mining, because we would have liked at that time to establish two giant electric power stations in West Java with coal as fuel.

Mrs Grier: So it was the economics that would make you go to coal as opposed to using the geothermal.

Mr Isnaedi: Correct. With regard to geothermal, we worked on that project with New Zealand. We have had that in West Java. It is clean, of course. Several resources were found, but again, New Zealand is not without financial limitation. That again is the problem. If it were with Canada, probably we would have more than one already. We cannot force it.

Mrs Grier: But perhaps that is one of the ways that we can overcome the reluctance of countries such as yours. If the industrialized world says, "We will help you in ways that are environmentally preferable," that presumably would be acceptable.

Mr Isnaedi: Sure, nuclear energy, for instance.

Mrs Grier: That is not preferable.

The Chair: To some of us.

Mr Isnaedi: I was told by my very good friend from a very important Ontario institute that if you want to have your air clean, then use nuclear energy.

Mrs Grier: What are you going to do with the nuclear waste?

Mr McGuigan: Ship it back to us.

Mr Isnaedi: Well, if there is another country that would like to keep it for us, that is what we will do with it.

Mrs Grier: If we sell it, we should keep the waste for you.

Mr Isnaedi: They have tried to sell it for many years now, but my answer to the question of why we are not moving towards that despite having uranium deposits at our disposal is, first, people have to be educated to live with nuclear energy, as are the ones who will work in the nuclear project, and we are not yet ready for that. We were supposed to have that first nuclear station in 1990. At the beginning it was in 1986, and then in 1990. Now we have moved it again towards 1994—

Mrs Grier: Good.

Mr Isnaedi: —and we do not know whether we will work together with Canada or with other countries. We know very well your Candu reactor system. I have been in so many projects there. We are very happy to work with Canada, but then again, it is a question not of the capability, financially as well as technically, but whether it is time for us to move towards that, because people have to be educated for that.

The Chair: Thank you, Mr Isnaedi. This has been a very interesting presentation. We have enjoyed having you here. We have learned a great deal, not only about the situation in your own country but in fact about the kinds of attitudes and pressures that are on other nations much like yours in the developing phase. I think I can speak for all of us when I say that we are grateful that you have taken the time to come to be with us. Your package of material is one that I know we are all going to read.

Mr Isnaedi: It has been very pleasant for me to be together with you and it is my hope to be together again with you, not in this complete location, maybe separately.

I can inform you that we will have the visit of a group of the Indonesian Parliament to Canada and they will visit also Toronto on the 22nd, 23rd and 24th of this month. It is my hope

that they will talk also with your House about environment problems, because we are very concerned with that.

The Chair: Wonderful. We will look forward to meeting with them.

The committee adjourned at 1651.

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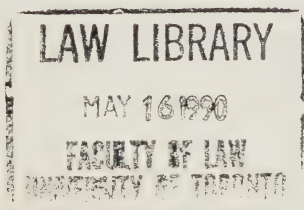
Le jeudi 8 mars 1990

Select Committee on Energy

Global warming and the
Greenhouse Effect

Comité spécial de l'énergie

Réchauffement planétaire et
l'effet de serre



Chair: Barbara Sullivan
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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Thursday 8 March 1990

The committee met at 1010 in room 151.

GLOBAL WARMING AND THE GREENHOUSE EFFECT (continued)

The Chair: We now have a quorum. The select committee on energy will commence.

ONTARIO HYDRO

The Chair: Our witnesses this morning are from Ontario Hydro, and although we know Hydro fairly well, I thought I would tell you something about the individuals who are represented in the Hydro delegation.

Al Holt is vice-president of corporate planning with Ontario Hydro. He graduated in civil engineering from the Liverpool College of Technology in England and joined Ontario Hydro in 1956, since holding numerous positions associated with engineering construction and financial activities. He was appointed vice-president of supply and services in 1988 and a year later was chosen for his present position as vice-president, corporate planning. His responsibilities include systems and corporate business planning, nonutility generation, load forecasting, economics and the environment.

Carole Burnham is director of environment with Ontario Hydro. Carole has devoted the majority of her career to environmental management, including 10 years in the private sector before joining Ontario Hydro. She became involved with the design and development division of Hydro in 1976 and was appointed section head of environmental sciences and technology in 1979. She spent a few years with Ontario's Ministry of the Environment where she served as the PCB task force leader. Later, she returned to Ontario Hydro and is currently the director of the environmental department. Her responsibilities include developing and recommending corporate environmental policies, advising on emerging environmental issues, co-ordinating and integrating environmental activities for Hydro.

Ken Snelson is presently the manager of demand and supply integration for Ontario Hydro. He began his career in England as a planner and researcher for the electricity distribution system, immigrating to Canada in 1969 and working since that time for Hydro. His placements have given him an understanding of system planning and the planning of transmission, generation and demand management resources. As the manager of demand and supply integration, Mr Snelson is currently responsible for planning, demand management, new generation, the retirement of old generation, acid gas control facilities and long-term purchase and sales transactions with other utilities.

Mr Pollock: Before we get into this, are we going to be allowed to break to meet with the Governor General when he comes in here, as a committee, or is that a no-no?

Mr Kerrio: No, I think it is your priority.

Mr Pollock: I see, okay.

The Chair: It has not been accounted for in the agenda. Our next witness is a guest from England, and we probably will want to continue right through. You can sneak out, however.

Mr Pollock: In other words, we can leave on our own, sort of thing. Fine. Thank you. Proceed.

Mr Holt: I would like to thank the members of the select committee on global warming for inviting Ontario Hydro here today. I have personally been here a number of times in the past on Hydro estimates and fuel supply matters. I thought the band was a nice touch this morning. That is the first time that you have done that for us and I appreciate it. I hope you do the same for Mr Franklin, because he might be a little jealous.

Mr Kerrio: The director was a Liverpudlian.

Mr Holt: I am going to lead this off with a brief review of the greenhouse gases emitted by Ontario Hydro. Carole Burnham will then provide you with some background on Hydro's task force on the greenhouse effect and on some of the Hydro activities that assist in limiting our emissions of greenhouse gases. Then Ken Snelson, who is one of the key authors of our supply/demand plan, will end with some details on carbon dioxide emissions from various fuels used in our generating stations and the potential effect from people switching from other fuels to electricity and what that could do to electricity demand and carbon dioxide emissions. At the end of that, I will try to make a couple of concluding remarks.

Of the substances considered to be greenhouse gases, Ontario Hydro emits relatively large quantities of carbon dioxide, CO₂, which is released by burning fossil fuels in our generating stations. While we use some of the other greenhouse gases, the chlorofluorocarbons and halons, we do this in relatively small quantities. We use them to dry-clean laundry at our nuclear generating stations, to clean electronic equipment and for air-conditioning and refrigeration purposes. We are developing and implementing plans to phase out and/or recover CFCs and halons that we use in closed systems. We are converting the dry-cleaning facilities to a wet-wash process. In the meantime, the dry-cleaning facilities have been equipped with systems that recover CFCs for reuse.

In 1988, Hydro's inventory of chlorofluorocarbons was about 50 tonnes and we had available about eight tonnes of halons in fire extinguishers. By the middle of this year we will have drafted a CFC corporate reference plan for the phase-out of the use of these gases.

Carbon dioxide is estimated to be responsible for about 50 per cent of man's contributions to greenhouse gases. The burning of fossil fuels to produce energy in transportation and industrial processes, space heating and electrical generation is largely responsible for the world's CO₂ emissions. In 1988, Ontario Hydro emitted about 31 million tonnes of carbon dioxide, compared with an estimated worldwide total of 18.3 billion tonnes.

We recognize that the greenhouse effect has potentially serious consequences and we have been looking at how we can reduce CO₂ emissions. In our demand/supply plan for the next 25 years we have established that Ontario Hydro could meet a 20 per cent reduction in CO₂ emissions by the year 2005 if—and these are some big ifs—our energy management measures are successful in reducing load growth, if we build one more

nuclear generating station and if load growth stays in the median range of our estimates.

Ken Snelson will be going into some detail on our study of how Hydro could reduce carbon dioxide emission in accordance with our plan.

As you know, this demand/supply plan will be examined in detail at the hearings that will take place under the Environmental Assessment Act later this year.

I am now going to turn this over to Dr Burnham, who will tell you about Hydro's task force on global warming and the results.

Dr Burnham: At Ontario Hydro we are concerned about the potentially serious problem of global warming for two reasons, both because of our potential contribution to it and because of its potential effect on our operations. A look at our operations shows that a number of things that we are already doing indeed help us to limit our carbon dioxide emissions. Looking at the Ministry of Energy's strategy on global warming, I am pleased to be able to say that we are already doing many of the things that the ministry suggests in its draft strategy.

In addition to that, I think a number of the things that the ministry proposes doing will help us to achieve our energy management targets. The steps that the ministry proposal suggests that are worth doing in their own right include reducing the use of technologies and chemicals that contribute to the greenhouse effect, saving energy and planting more trees. We have initiatives in place that follow these objectives.

We are reducing the use of CFCs and halons and studying options for reducing carbon dioxide, which Mr Snelson will talk about. We have also already launched demand management incentives and programs to help Ontario become more energy-efficient, and we are planting trees in the province.

We do have a reforestation program in which we offer reforestation to land owners of an area equivalent to that cut in new rights of way in southern Ontario, and in fact in northern Ontario as well. We have a policy of offering these replacement trees to people and we do replace them to the degree that people are willing to have them replaced.

In 1988, we struck a task force to study how a reduction of carbon dioxide and other greenhouse gases would affect our operations. The objectives were to develop a corporate position on the control of greenhouse gases; to present information to our senior management on planned CO₂ control legislation; to evaluate the effect on Ontario Hydro of meeting a 20 per cent reduction in CO₂ by 2005; to discuss reducing other greenhouse gases instead of or in addition to CO₂; to evaluate the effects of potential climate change on Ontario Hydro operations.

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Just to review, I think most of you on this committee are already very familiar with our operations, but in 1989 about 25 per cent of our electricity was generated from fossil-fuelled stations, 25 per cent from hydroelectric stations and 50 per cent from nuclear. So if the greenhouse effect is a warming of the earth because of carbon dioxide and other greenhouse gases preventing heat from escaping back into space, then why can we not eliminate fossil generation as one of the largest sources of CO₂? That is because the positive side of fossil generation is flexibility.

Our fossil-fuelled stations are already our least-used facilities because they have higher fuelling costs than our hydroelectric and nuclear stations, but they have certain advantages and we need them at certain times. They can be quick-

ly fired up. They meet peak demands during the day during certain seasons and are available to us for responding to unexpected or planned outages or reductions in supply from other parts of our systems. They are generally the last stations to be started up and the first ones to be shut down.

If we have co-operation in the use of less electricity, the generating stations that we will cut back on first will in fact be our fossil-fuelled ones and we hope that energy efficiency will be able to help us reduce our reliance on the burning of fossil fuels. That is why the demand management and energy efficiency measures that we have are very important in minimizing environmental effects.

Again, I think you are probably aware of our energy management initiatives across Ontario. We will be spending \$1 billion over the next five years on these measures. We hope to save 3,500 to 3,700 megawatts of power by the year 2000, and that is about the amount of power needed by Metro Toronto on a winter day or the amount of power that will be put out by the Darlington nuclear station. We have already launched energy management programs in the industrial, commercial and residential sectors, involving the use of energy-efficient motors, lighting, heating and building design among other things.

In addition to public awareness about saving electricity or using it wisely, I am interested in making a connection between the individual and his use of electricity so that he accepts some responsibility for the carbon dioxide that is being emitted. For every kilowatt-hour of electricity that is consumed, 900 grams or two pounds of carbon dioxide are emitted to produce the power that they use. Over the winter, we estimate that about 10 tonnes of carbon dioxide can be saved from going up our stacks if a house is an R-2000 house.

Other ways in which we can save megawatts are by independent generators that produce their own electricity when they use hydroelectric generation or fuels other than fossil fuels or by cogeneration in which they improve the efficiency with which the energy is used. That is what we are encouraging through our nonutility generation division. We hope to have in the order of 2,000 megawatts of independent generation again by the year 2000. Because of the many pluses of hydroelectric generation, we expect to be adding about 3,000 megawatts of capacity to our system over the next 20-odd years.

Finally, instead of making electricity, we can buy it from other utilities. We have recently signed a contract with Manitoba Hydro for the purchase of hydroelectric generation. So, for one thing, all of these are things that we are doing ahead of providing new supply and will, we hope, limit our use of fossil-fuelled generation.

So we do care about the potential problem of carbon dioxide emissions and, until we have conclusive evidence on global warming, we are doing things that will help reduce carbon dioxide emissions at the same time as we take the most sensible course for reliability, energy mix, price and reduced reliance on fossil fuels.

Ken will go on now to give you some specific details of our greenhouse report.

Mr Snelson: To do that, I will use the overhead projector, if that is convenient to you.

Mr McGuigan: While we are waiting, Mr Chairman, I have a question. On the R-2000 house, which would save 10 tonnes of carbon dioxide, you would not use 10 tonnes of coal. I guess the chemical reaction is that you produce more carbon dioxide because of the addition of the oxygen than you do of the original carbon material that you burn.

Dr Burnham: Yes, that is correct. The weight of carbon dioxide, because of the additional oxygen, is heavier than the carbon.

Mr McGuigan: What is the ratio there?

Dr Burnham: Let's see. I guess it is 12 grams versus 44. So it would be about four times.

Mr Holt: As I said, we emitted about 31 million tonnes of CO₂ in 1988 and we only burned about 11 million or 12 million tonnes of coal. So it is about three to one.

Mr McGuigan: So you put out about four times as much.

Dr Burnham: Yes, between three and four times as much. That is the whole problem with the chemical reaction.

Mr Snelson: As we have said, Hydro contributes about 19 per cent of the man-made CO₂ emissions in the province and about 0.14 per cent in the world. Canada is about two per cent of the world emissions and North America is about 25 per cent. These percentages are expected to decrease, not necessarily because CO₂ emissions in North America are expected to decrease, but as the Third World industrializes and its emissions increase.

The greenhouse effect is a global problem. It will require a solution that requires co-operation among all sectors of the economy, including other energy industries as well as the electricity industry and other countries as well as Canada.

When we come to the practical methods for reducing greenhouse gases in general, and carbon dioxide in particular, then there are three main ways in which that can be done.

The first one, and probably the preferable one, is to increase energy efficiency so that the desired level of energy service is achieved with a lesser quantity of energy being produced and a lesser quantity of emissions, including CO₂ emissions.

The second general strategy is a shift to lower-carbon fuels. I might say, in that energy efficiency there, that it is the efficiency of the use of all fuels and not just electricity.

You can also shift from high-carbon fuels, such as coal, to fuels that have lesser amounts of carbon in them, such as natural gas. So there can be a reduction achieved by moving to lower-carbon fuels. If those measures are not sufficient, then there is nothing left but to shift to nonfossil energy sources, which include hydroelectric, nuclear, solar, wind, all of which are likely to be delivered by means of electricity.

We did some sort of general estimates of how much CO₂ emissions there were by typical end uses of energy. This is a simple example related to a home heating unit, and if the natural gas furnace is the typical form of heating for an Ontario house today, then a substantial reduction can be made by going to a high-efficiency gas furnace. If you were to instead heat with electricity, clearly if the electricity is produced all from coal, then that produces a very large increase in the amount of CO₂ that is emitted.

However, most of the electricity in Ontario is produced from fuels that do not involve the emission of carbon, and the electricity mix that we have here is 85 per cent from hydroelectric and nuclear and 15 per cent from coal. If you just have straight electrical resistance heating, then that is a lower emission of carbon dioxide than even a high-efficiency gas furnace, and if one moves to a high-efficiency electrical technology such as ground-source heat pumps, then a further reduction in emissions can be achieved.

Mr Kerrio: Excuse me; just before you leave that slide, on the lower three you say electric-coal, electric-mix and electric-

mix. What about electric-gas, if we are doing any in that field? How would that reflect on natural gas, with individuals burning it as opposed to Hydro generating with gas? Would the percentage be much the same as the top or would there be some improvement in efficiency?

1030

Mr Snelson: Generally speaking, if the electricity is being produced from gas and used to heat a house, there would be less emission if the gas was burned directly to heat the house.

Another example that we calculated was for a typical car, an automobile. If the gasoline-powered automobile is the standard for today, then a reduction can be achieved by going to compressed natural gas as the fuel for that vehicle, but there are also electrical options. Again, if you were to have a battery vehicle with electricity produced from coal, that would be a move in the wrong direction, but with electricity produced from the same mix of 85 per cent from nonfossil sources, then that would be a substantial reduction in emissions. There are prospects for further development of more efficient battery systems, which may make further reductions.

These are just examples; they are not intended to be definitive. But the conclusion that we draw from this is that electricity production, while it may be part of the problem of CO₂ emissions in global warming, can also be part of the solution in that electricity produces less CO₂ than the cleanest fossil fuels, provided there is a favourable mix of nuclear and hydraulic generation in the system. This favourable effect is further enhanced if a highly efficient technology is used in the use of the electricity.

We did some projections of whether or not we could reduce our carbon dioxide emissions by 20 per cent from 1988 levels by the year 2005, which is the illustrative target that has been set by the provincial and federal governments. Our conclusion was that we can meet that target if the load growth is as the median forecast, if we succeed in getting the economic and nonutility generation that we are planning on, with the demand management and hydraulic developments that we are proposing to implement, and if one new nuclear plant is constructed in that period.

We also did some projections of what might happen to our load if all sectors of the economy had to reduce their carbon emissions by 20 per cent. In that process we assumed that some very large efficiency savings were made, of the order of 20 per cent to 35 per cent, in the use of other fuels, but that where people ran into roadblocks they might shift to electricity. In that case we found that the electricity use could rise to somewhere a little above our high or low forecast by the year 2005, and that it would be very challenging to produce enough electricity from nonfossil sources to be able to meet that increased demand and reduce carbon dioxide emissions at the same time.

Where we come to is that while electricity production from nonfossil sources may be a good long-term solution where efficiency is not sufficient, the regulatory changes need to be phased in to permit infrastructure to change, because otherwise there could be a rapid shift to electricity, causing increased load, and in the short term our only response could be to increase production from fossil fuels—coal, oil and natural gas. The likely effect would be reduced reliability of the electricity system and increased emissions of greenhouse gases, which would be the opposite of the desired result.

This is the projection of CO₂ emissions that is in our greenhouse report. I do not believe the detail of it is still valid because of changes that have taken place since. However, the

general picture of being able to get down to 20 per cent below 1988 levels by 2005 is still correct, and there is still the potential in the late 1990s and early 2000s to have increasing emissions if electricity demand grows and the production from nonfossil sources cannot match up from that.

The Chair: Could you save that chart for a second? I do not understand why at the year 2005 the projected CO₂ emissions are at a high and then at 2007 they seem to drop substantially.

Mr Snelson: That would be with the introduction of additional nuclear generation.

When we tried to put this together into what Ontario Hydro should do, recognizing that this is still very much an emerging and evolving issue as to how governments and society will respond, then we recognized, as Carole said, that there were a number of things that we were doing for other good reasons that tended to move us in the right direction. Our recommendation was that we should continue to favour the elements of our operations and planning that will aid in the reduction of greenhouse gases. Demand management for electricity we believe to be economic in its own right and we are pursuing it as part of our plans. We should also continue to pursue it for reasons of carbon dioxide.

The energy conversion efficiency in our own existing plants is something which, if we can improve, then we have less emissions. We also use less fuel and it is something that we pursue as part of our normal operation policies. Cogeneration has the potential to generate electricity with relatively low use of fuel and relatively low carbon emissions. Through the nonutility generation parts of our plan we are pursuing that. We should continue to do so. We give preference to renewable resources such as hydroelectric; they do not emit carbon.

Maintaining the Candu option is part of our demand/supply planning strategy and is something that our demand/supply plan relies on to a considerable degree. We should continue to maintain the Candu option. Preserving flexibility to meet upper load growth may not seem to be directly related, but if electricity consumption were to rise because of people switching to electricity, then it will be important that our plans have some flexibility to do that and to do it with fuels other than those that produce carbon dioxide.

1040

The combustion turbine/combined cycle/IGCC option as a peaking option is preferable to a pulverized coal-fired plant as a peaking option because it is, initially at least, fuelled on gas and you do not need to go beyond that stage. It can end up as a very efficient gas-fuelled generating plant with fairly low emissions of carbon dioxide as fossil-fuel plants go. Our plans make provisions to retire existing plants, including existing coal-fired plants, at the end of their useful life. That flexibility is important to maintain so that those plants can be replaced if that is necessary, either for carbon dioxide or for other reasons.

That philosophy for that recommendation of continuing with the things that make sense, which we feel we are doing, in helping to reduce carbon dioxide emissions, is, I believe, consistent with the general thrust that was put by the government in its policy paper on carbon dioxide.

That concludes my remarks. Al has some conclusions, I think.

Mr Holt: If global warming is as serious as some scientists suggest—and I would point out that the scientists at Ontario Hydro in our research division and other areas agree that it is a serious problem and worthy of attention—there will have to be

changes around the world. These changes are not trivial and they will not be solved within Ontario Hydro or in Canada alone.

None the less, as I have said, here in Ontario there are some hard choices we ourselves can make. We can limit the production of CO₂, but to do that Ontarians will have to curb their increased demand for electricity so that growth falls into the middle or below the middle range of our forecast rather than at the high end.

If we are permitted to move forward and implement our hydraulic generation program in an economic way—and non-utility generators can supply energy from sources that do not add to the CO₂ effect—and if the major sources of new supply that will be needed as we move into the next century can be nonfossil, then I believe we can make the 20 per cent reduction that has been talked about. However, the warning Ken mentioned—that there is a real danger that other industries can switch from their current use of fossil fuels to solve their own problems in meeting legislated limits and can substitute electricity, which will shift the burden back to us and we will have to struggle to perhaps meet a higher load growth than is even forecast as the high load growth in the supply-demand plan—is not going to solve the problem. We need to be careful that we are solving the problem and not just moving it around.

Thank you very much for your attention.

Mr Brown: One of the things I was noting as we looked through your wonderful Balance of Power document, whether we look at SO₂ emissions or whether we look at carbon dioxide emissions or whatever, was, there is a remarkable advantage to plan 22 over plan 15, the more nuclear option. Granted, there are environmental problems there too; they are just different. If you are talking about air quality, certainly plan 22 is far superior. One of the reasons in your literature that you say plan 22 is not as acceptable is that there would be a higher cost because it is more difficult to peak with nuclear power and you would end up doing some of those things.

I was just wondering if you could comment on that. It occurred to me that the peaking power of nuclear power could be enhanced if you used the excess electricity when they are running at more like full power, where they are most efficient for things like creating hydrogen.

Mr Holt: That is really two problems. The nuclear power station, because of its very high initial capital cost and low fuelling cost, is ideal for base load operations. If you are building nuclear power to meet capacity factors in the middle range, then it becomes less economical than using the fossil fuel option. So there is a cost element to it as well as the matter of just using the power. It becomes more expensive.

But the other issue is that certainly there are a lot of people who would share your views that nuclear power is the answer in terms of the emissions. Right today, we are burning something in the order of 10 to 12 million tonnes of coal a year. If we did not have nuclear plants and we had all fossil on our system, as some of the systems south of us have, we would be burning over 40 million tonnes of coal a year and our emissions of CO₂ would be four times as high as they are today.

But there are a lot of people who worry on the other side of the question. They are worried about nuclear waste. They are worried about safety and they are worried about those other things. Our approach to the plan, as it says, is to walk the line between those various issues.

You are quite right. From a point of view of atmospheric emissions, plan 22 is superior to plan 13.

Mr Brown: Following there, the numbers are quite remarkable. There is quite a difference in air quality emissions, whichever particular gas you are talking about.

It says in the literature that you are looking at about a 10 per cent additional cost over plan 15 to implement plan 22. What kind of impact on the rates would that effect? It also occurs to me that if you are spending slightly more on a capital program to do this, there is more room for energy efficiency also within the system, seeing as price will drive that, both on incentives and just the disincentive of paying more for electricity.

Mr Holt: I do not have the number that it would impact on. Rates obviously, they would be less than that number because we are just dealing with the increment when we deal with the relative plans, so there is a big base to the system. I do not know whether you would know the number, Ken.

Mr Snelson: I could look it up, but they would be less, as was said. It also would require more capital for an earlier capital construction program.

Mr Brown: That is factored into the cost, though, is it not?

Mr Snelson: I believe you will find that the numbers are in the book, if you care to look through it, but I am not sure that that is really our purpose today. We have a supply hearing coming up.

Mr Brown: We are looking at the greenhouse effect and if we are looking at gas emissions, which we are, obviously, that is the preferred plan, although you have plan—I forget the number of it right now—that is far more ambitious if you are talking about nuclear energy.

Mr Pollock: I just wanted to know: Are all these figures you are putting out with scrubbers on your smokestacks? If they are, has that reduced the emissions of CO₂? Is there any way to take all CO₂ out of the air?

Mr Holt: Do you want to take the first one?

Mr Snelson: Our plans include scrubbers to reduce sulphur dioxide emissions and nitrogen oxide emissions to degrees that we believe are sufficient to meet regulations and to meet our environmental requirements. But neither type of scrubber has any significant effect on reducing carbon dioxide emissions, so scrubbing of carbon dioxide emissions is not really a technically feasible thing to do at this time.

There are some pie-in-the-sky kind of proposals, but they have not been proven as yet and they may end up greatly increasing the cost, doubling the cost or more, of producing electricity from fossil fuels, and there is still no known way of disposing of the carbon dioxide once you have managed to extract it. Basically, at the moment, removing carbon dioxide is not considered to be a technically feasible option.

Dr Burnham: I would just add that any existing techniques not only are very costly but they are very costly in the fact that you would have to use up to 50 per cent of the energy that you generate to scrub the carbon dioxide, so it is self-defeating.

Mr Pollock: Just brief us a little bit on what has been proposed to get that carbon dioxide out of the air.

1050

Dr Burnham: It is basically just a scrubbing process that would convert the carbon dioxide into a carbonate product. The problem is that this is not stable and eventually leaks back into

the atmosphere in the form of carbon dioxide. So you are really not doing much about the problem. You may be fixing it for a short period of time. That is why people do not talk about scrubbing carbon dioxide. They say that really the only way you can reduce the amount of carbon dioxide produced is by reducing the amount that you rely on fossil fuel as an energy source.

Mr Pollock: In none of your charts was there any mention of wood. Does wood put out the same amount of carbon dioxide as coal?

Mr Holt: I would think it probably does. I do not really know, but there will be some small nonutility generators that will use wood in small plants to supply us. I think there is one already in operation, and there are others, but it is so minute that it is not really relevant to these sorts of numbers we have put forward.

Mr Snelson: There are also people who will point out, quite correctly, that burning wood releases carbon dioxide to the atmosphere, but if this is wood that is coming from a plantation and you are replanting the trees, then those trees are absorbing carbon dioxide. If you go through this cycle many, many times, of growing trees, burning them, growing trees and burning them, then there are no net emissions of carbon dioxide to the atmosphere from that cycle.

Mr Pollock: There are no net emissions?

Mr Snelson: If you regrow the trees that you burn and you continue that process of growing trees and burning them.

Mr Pollock: That is interesting.

Mrs Grier: I want to start by being reminded of some of the estimates we heard in other incarnations of this committee. Can you refresh me, for example, on three figures: your growth factor, the amount you anticipate from demand management and the amount you anticipate from cogeneration. As compared to the forecasts you were making in 1989, for example, how have those forecasts changed by now?

Mr Snelson: The growth rate we are projecting is in the two per cent range, I think.

Mr Holt: The median load growth is 2.3 per cent.

Mr Snelson: And there was a range about that. That has not changed very much in the last few years.

The projections for conservation for electricity efficiency improvements are about 2,000 megawatts by the year 2000, which is very similar to what you have heard before, due to our efforts. In addition, we expect that there would be about 1,500 megawatts of energy efficiency improvement that will come about as customers respond themselves and gradually turn over to more efficient electricity-using capital stock.

Mrs Grier: So is the 2,000 megawatts by the year 2000 incentive-driven?

Mr Snelson: Yes, in addition to 1,500 megawatts that will come—

Mrs Grier: That will come naturally, however.

Mr Snelson: In addition to that, we are estimating 1,000 megawatts of load shifting, which is about the maximum that is useful to the system in terms of being able to shift energy use from daytime to night-time. If you go to much more, then you

start to have more problems at night than you would otherwise have had in the daytime.

Mrs Grier: And what about cogeneration?

Mr Snelson: The plan is about 1,500 or 1,600 megawatts by the year 2000 for cogeneration and all nonutility generation. That will include cogeneration and private hydraulic developments.

Mrs Grier: In other words, really none of those figures has been altered since your submissions to the last select committee.

Mr Snelson: I believe that the nonutility generation numbers are increased somewhat since the last select committee.

Mrs Grier: In our extensive discussions last time around demand management, I think it was agreed by all parties, even occasionally by Mr McConnell and other Ontario Hydro witnesses, that the studies that would definitively say how much could be gained from efficiency and demand management were absent and needed to be done. I am wondering what has happened since then to make you better able to forecast what can in fact be generated from demand management, given certain incentives or certain inducements.

Mr Holt: In support of the demand/supply plan a considerable amount of work has been and is continuing to be done in preparation for the hearings that will take place starting in September. There is more work being done on the demand management numbers. There is work being done on avoided cost. All those issues and the rationale will be examined in that hearing. I recognize that from the point of view of this hearing, whatever those numbers are has some effect on the greenhouse gases, but we are really not in a position here today to debate the validity of all those numbers in the demand/supply plan, which I believe is more rightly dealt with at the Environmental Assessment Board.

Mrs Grier: I guess I had hoped that the logic of some of those conclusions might have been so self-evident that there might have been a move towards implementing some of them in advance of the final determination of the recommendation to the demand/supply study.

Mr Holt: That is certainly happening. The demand management programs are all around us and being implemented right now, and the nonutility generation program is progressing. There are some difficulties because of the lack of certainty over avoided costs at this point, but all those programs are continuing, as are programs to put scrubbers on and a number of other things. But the question of whether the plan has the right amount of demand management, the right amount of nonutility generation and the right amount and the right type of supply or not is the matter that has been referred to the Environmental Assessment Board.

Mrs Grier: I recognize that. I just wanted to be clear as to whether or not you had revised any of your forecasts in the light of experience since then, and I take it you have not significantly.

Mr Holt: Some of them have been.

Mrs Grier: We heard at this committee again, as we had heard at the last two, about the advantages of such things as efficient lightbulbs, and we had our demonstrations of the actual bulbs. Yet the average householder in Ontario cannot find them at a reasonable price. One of the interesting submissions

was that the cost of building a very efficient factory to produce efficient lightbulbs was something around \$7 million, as compared to the cost of even beginning to build a new nuclear generating station or to invest in some other modification. When do we get to the point of being able to take advantage of these technical advances that we heard are available in the United States at prices way below what we might want here?

Mr Holt: I read some of the transcripts and the prices in the US for the lightbulbs were quoted in the \$15 to \$20 range. Here they range up to as much as \$40. I have some of them in my house. They are not as applicable to the lighting systems we have as you might think. You cannot use them with dimmer switches and you cannot use them in certain types of sockets. The application is not quite as easy as some people would have you believe.

The other problem really is that lighting does not consume a great deal of the consumer's costs of electricity. I had a survey done at my house and the estimate is that my cost for lighting in a year is \$120. It is not a very large incentive, when I can buy four lightbulbs at Canadian Tire for \$1.39, to go out and spend over \$20 for one lightbulb somewhere in my house to get at something like maybe five per cent of the \$120 bill over the year. So a big consumer education program has to go on to build a market to justify building factories to sell that sort of lightbulb. There may be other ways we can do it, but it is not easy to get penetration in that type of market.

Mr Cureatz: If I might just refresh my memory, I have forgotten the breakdown of consumption, say, in the average home of heating and dryers and dishwashers.

Dr Burnham: I have space-conditioning estimated at about 66 per cent. This is in 1987. Space-conditioning includes heating and cooling. Appliances are 17 per cent and water heating 18 per cent. The biggest improvement a householder can make is obviously in more efficient heating and cooling systems, and the next place is water heating.

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Mr Snelson: Perhaps I could just add that the place where lighting can make its biggest contribution to energy savings is in the commercial and industrial areas, where you have quite extensive lighting systems that are on for very large periods of time. There are active programs being promoted by Ontario Hydro for improved efficiency of lighting in the commercial and industrial sectors, and they are available now, I believe.

Mrs Grier: One of the other interesting considerations which another witness gave to us was, and I guess my question is, have you ever calculated the amount of CO₂ that would be emitted during construction of another nuclear plant—in the preparation of raw materials, the cement and what is involved in creating another nuclear plant?

Dr Burnham: We are in the process of doing those calculations in preparation for the hearings. You have to balance those against the amount that you produce in mining coal or building a new fossil-fired generating station. Any new supply obviously is going to produce some carbon dioxide in the construction process and in the supply of the fuel. Similarly, any demand management product also is going to have some carbon dioxide emissions involved in its manufacture and in the raw materials involved for that.

Mrs Grier: I recognize that. I was hoping for it for comparative purposes.

Dr Burnham: We are in the process of doing some studies to come up with those numbers.

Mrs Grier: Finally, if I may, the other question I have been wondering about is, we saw some graphic slides yesterday of the residue on plant life in other parts of the world as a result of emissions. What proportion of the CO₂ that is emitted in fact remains airborne and contributes to the greenhouse effect and what proportion comes to rest or is a problem in some other sphere?

Dr Burnham: I am not aware of CO₂ particularly being a problem in terms of affecting plants. If anything, I was under the impression that it stimulated the growth of plants. What we are dealing with is a carbon dioxide equilibrium in the planet. It is really a matter of how much goes into the oceans and how much gets absorbed by the trees. I do not want to trivialize it, but what humans are doing is really disturbing the equilibrium by releasing the carbon that has been stored in the earth for many years in the form of carbon dioxide.

Mrs Grier: So it does not matter where it is.

Dr Burnham: That is right. It is really a global problem. What we are doing is just disturbing the balance so that there is more CO₂ going out into the air.

Mr Kerrio: On this particular figure 2, "Ontario Hydro's/Canada's CO₂ Emissions," I would hope that in a sense we get some kind of graph that is going to be the same wherever we look at it. Here is the problem I have with this particular piece of information: I agree with the comments, and nearly everyone who has made a presentation has told us that this is a worldwide problem and we all have to address the problem or we are not going to be able to really get anywhere. In the middle of the page it says that our contribution is two per cent of the world's CO₂ emissions and, "These percentages are expected to decrease." I have difficulty with this kind of comment because it could be possible that if we did not do anything the percentages could decrease. When we look at China and some of the other aspects of the parts of the world that are going to increase combustion and generation, by burning huge amounts of coal particularly, the CO₂ emissions are going to go way up and we could look good because our percentages go down.

In fact, I would like to see some kind of scale drawn where we challenge other jurisdictions and keep our own house in order. Instead of suggesting that the percentages could go down because other jurisdictions go up, we should really rather focus in on what we have, what we propose to do and not quite challenge, but get other jurisdictions to co-operate, such as the Netherlands. I felt that was one of the best presentations we have had so far, for a country that emits about one per cent to take the kind of initiatives it is taking and keep in perspective what its initiatives are going to produce and not look at the percentage worldwide and, having done nothing, take some credit for a reduction.

Mr Holt: I think you are quite right. That percentage does drop just because of what other people are doing, particularly the Third World countries. I think somebody on this panel said that we do not want to appear to think the problem is trivial from our point of view, because it is a serious problem, but you have to keep that in perspective.

As I mentioned earlier, we are burning about 10 million or 12 million tonnes of coal a year right now. The highest we ever burned was about 16 million. The demand/supply plan indicates

that by the year 2000 we will be down to eight million tonnes of coal a year. That is what Ontario Hydro will burn. South of the border they are into the hundreds of millions of tonnes of coal a year, and as you said, China is moving over the one billion mark and towards two billion.

So the Third World countries are moving into fossil-fuel burning and I think the developed countries have to be moving out in their economic evolution into new forms of energy and better technologies to make room for that. I do not believe that the Third World countries can make the major leap into nuclear power without going through some of that process unless the developed countries are prepared to pay for it. There is no question that there is an expectation that a lot of the major increase of CO₂ emissions and greenhouse gases will come from developing countries as they move into burning large quantities of coal, for example.

The Chair: We still have a number of questioners and we are past our time. I am going to ask questioners to be as concise as possible.

Mr Charlton: I will try. I will cut out one of the questions I was going to ask.

I would like to go back to figure 7 where we were talking about the 20 per cent reduction and Hydro's ability to meet that by 2005, assuming a number of things. I want to understand precisely what the view of each of these items is or what they really mean. The first one says that "load grows as forecast." So that is a given for all the rest of the items in that four-item list.

Mr Snelson: Yes.

Mr Charlton: So we have Hydro right on target at 2.3 per cent per year, on average, over the next 25 years. The new nuclear plant constructed, which is the last item, is that required as part of what you are saying here because of meeting new demand from the load forecast for the purpose of backing off fossil fuel plants? Why is it in the list in particular?

Mr Holt: It is to meet the load forecast, to meet the growth.

Mr Charlton: So, for example, if items 2 and 3 were both double your current expectation, item 4 could drop off that list.

Mr Holt: It would not necessarily drop off the list, but it would come along later in time, yes.

Mr Charlton: But in terms of the 2005 question and the 20 per cent reduction, they could be met without the nuclear plant if the load forecasts are correct and a number of other things happen somewhat differently. For example, we have had the press around the whole question of nonutility generation over the last several months and whether Hydro's figures are substantially low or not. And you are right, we will not be able to fully answer that question until the avoided-cost question is dealt with at the hearings. But there is substantial speculation in a number of sectors here. This is what I am getting at.

Mr Snelson: One of the things our plan makes very plain is that we have certain priorities and certain preferences, and non-utility generation at less than and up to avoided cost and economic demand management and hydroelectric are preferred over nuclear development. The estimates that are in the plan are what we are relying upon to meet our load growth, but they are not caps. If we can achieve more at an economic level of cost and avoided cost, then we will, and that will permit those other things to be put back.

Mr Charlton: Thank you. I wanted to hear that. The question that flows out of that is a question that has concerned me

for quite a while, but it is starting to concern me a little bit more than it did in the past. The Candu units at Pickering and Bruce have, or a number of them have, basically set performance records in the past. We have been into some serious problems at Bruce A with performance over the last several years in terms of capacity performance, and the numbers have dropped substantially. Hydro has taken the position that it believes it can resolve those problems and it hopes to have them sorted out soon. We have heard those words "believe" and "hope" a number of times, but the responses from Hydro have not been significantly more specific than that in terms of the ongoing operational problems that are evolving in the middle years of the Candu system, at Bruce, anyway.

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The Chair: Could you reach your question?

Mr Charlton: Hydro, I know, if it resolves those problems, will continue to utilize the system and promote it in its planning process. What contingency plans does Hydro have if the ongoing operational problems with the Candu system cannot be resolved satisfactorily?

Mr Holt: Let me go to your point of how serious these problems are. It is correct that the plants are not operating today at the target level of reliability. They are getting older, but they are not that far off. Our long-range reliability/availability criteria for the nuclear units is 80 per cent. We are currently operating at an average of something around 75 per cent.

We have a number of programs now in place that are targeted over the next five-year period to bring those plants back to the 80 per cent average. Our engineers and people believe that can happen. There are specific plans. We know what the problems are. We know why they have to be taken out of service and what has to be done and they are going to be put back into operation again. We are spending additional money and we are going to put more money into maintenance to hold at the 80 per cent level. The plan is very long term. If after another two or three years the deterioration continues and we do not correct it, then we will have to do something else. But I believe right now the plan is reasonable.

Mr Charlton: That was what my question was, though. Our system has become very dependent on the Candu nuclear system. The kinds of projections we are getting here in terms of problems like CO₂ are very reliant on the operation of the Candu nuclear system. Are there any contingency plans anywhere for what Hydro is going to do if those problems cannot be resolved satisfactorily?

Mr Holt: I do not believe that you need major contingency plans if you have operating performance within five per cent of the estimate. In fact, we have had a lot more trouble with our coal-burning stations than the nuclear plants over recent years.

Mr Charlton: Remember, though, that the 75 per cent that you are operating at now is 20 per cent below what the Bruce units operated at for the first number of years, not five per cent.

Mr Holt: When you first put it in, but the long-term average capability factors were always estimated at 80 per cent.

Mr Charlton: I understand that.

The Chair: Mr Charlton, I would like to move on to another questioner, if I may. Mr Callahan, I would like to keep this to about three minutes.

Mr Callahan: Can the turbines that create energy for Hydro be operated as a result of using natural gas?

Mr Holt: The ones that are in the plants now, it does not matter to the turbine what the steam came from. The steam can be produced by any fuel: nuclear, oil, gas.

Mr Callahan: I have to hurry, so I want to get to the next stage of my question. Would it be an extraordinarily high extra cost, had Hydro used in the past or used in the future, natural gas to generate energy? If it is not extraordinarily high, why has it never been done, considering the enormous amounts of CO₂ that Hydro seems to be emitting to the atmosphere?

Mr Holt: The costs are enormous, not from converting the plants but from the cost of buying the fuel. The price of natural gas is two to three times the price of coal, and the enormous costs in switching and using gas as a base fuel—even if there was enough gas to bring into Ontario to do that, which I doubt, it would be very uneconomic. The role of gas is as a peaking fuel to meet load over short periods of time.

Mr Callahan: The reason I asked it is, you say the cost is two or three times. It seems to me that when we are facing China obviously going to be using coal and creating a great deal of CO₂, and other emerging countries—and the Ukraine is not going to allow the nuclear efforts to take place after Chernobyl—I think it becomes something that is necessary to convince the people of Ontario, and perhaps of Canada, that that cost has to be—it was not a matter necessarily of competition, was it, between electricity and natural gas that precluded the use of natural gas to create energy?

Mr Holt: No. I think the main reason was that using a vast amount of a nonrenewable resource like gas as a base fuel in utility plants was not seen as a good use of that resource.

Mr Callahan: Coal is a nonrenewable resource, except it pollutes the atmosphere.

Mr Holt: But there are vast reserves of coal. The reserves of gas have a far shorter term.

Mr Callahan: If we do not have reserves of gas, then we should not be selling it across the border to the United States as we are.

Mr Cureatz: Are you bringing that up again?

Mr Callahan: Sorry. Those are my questions. Thank you.

The Chair: Perhaps we can move to Mr Cureatz now. Would you please resume your seat so that you can be picked up.

Mr Cureatz: Those are all in the standing orders, if I cannot stand up. I want to stretch. It is tough competition with the Governor General outside and here I am trying to ask a question of the Ontario Hydro officials. I just want to tell them that I can continue all day about their presentation, but I will not because I have about two and a half minutes.

The Chair: Correct.

Mr Cureatz: Strangely enough, after about five years of listening to my learned colleague, Brian Charlton, who has been talking about energy conservation, it is slowly sinking in with me. Now I know I am a Conservative and these things are hard on us.

Mrs Grier: Faster than with Hydro.

Mr Cureatz: That is right; exactly. Well, that is just the point I am making. Now of course, I have the Darlington generating station in my riding, and Monday I visited there again after about six months with the candidate of my choice for the leadership of my party, by the way.

Mr Callahan: Who was that?

Mr Cureatz: Dianne Cunningham. It makes for some interesting talk around the caucus table when I am sitting across from Mike Harris, but that is beside the point. It is overwhelming and I feel very confident. As I said to Dianne: "There is one thing about Hydro: They sure spend the bucks. But when they do it, they do a good job and I feel very comfortable about our system there and about our generating systems across the province."

I have no doubt in my mind about your efforts on reducing CO₂ emissions. If anyone is going to do it, it is going to be you people, that is for sure. But I will tell you, and without getting into a long tirade, you say here that you are going to spend \$1 billion over five years. Is that right? Is what I read here on whatever page it is—they are not numbered.

Dr Burnham: Yes.

Mr Cureatz: A billion bucks. That is like \$4 million a week. Right? A quick calculation, \$4 million a week. To me, that is a heck of a lot of money. Is it not?

Now, I just do not feel comfortable, I have to admit, with all due respect to Hydro, that you have sort of got the picture yet. You are concentrating on CO₂ emissions, but to me there is a bigger overall picture. Be it the longer-term lights that Ruth Grier had brought out, be it these motors with differential transmissions—I do not know the terms. I am not an engineer.

I can think of heavy industry. At General Motors—I represent a part of the city of Oshawa—they can take a line in from one of the Candu reactor units at Darlington, 850 megawatts, to turn the whole darned old plant. Well, there has to be one or two electric motors in there that you can be frigging around with to try to save a little bit of electricity. You talk that you are going to buy electricity from Manitoba. That is just terrific because it is water falling down. Of course, we had our expert in yesterday and he says: "Great. So you put up a big dam. What about the methane gas that might be produced from the ponding up of the water that is producing electricity?"

To me, there is an overall picture here. So you take the \$4 million a week or the \$200 million a year; I do not know, do you have a department within Hydro that is looking at the bigger picture and saying, "Let's talk to industry"? I have my little thermometer that Bob Franklin gave me, put it in the fridge I look at it all the time, every time I open up, but to me there are some other things that can be done. I really feel uncomfortable that Hydro has not grasped the bigger picture. Have you set up a department? At \$4 million a week, you can hire somebody to be talking to industry and talking to consumers and looking at the motor problems and getting all these experts together for conservation. I am just feeling a tinge uncomfortable. There is my speech. That is my question. Have you got a department and are you putting it all together?

The Chair: Sam has a cable show for next week.

Mr Cureatz: They cut me off from that too.

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Mr Holt: In the interests of time, the answer to the question is yes, we have.

Mr Cureatz: Great. Okay.

The Chair: We are going to conclude this session now. We appreciate Ontario Hydro coming to be with us. I am sure we will be asking you back to participate in hearings as we move into a later phase of our committee activity and we will look forward to welcoming you again at that time. Thanks for being here.

PHILIP JONES

The Chair: I would like to welcome our next witness before the committee. Dr Philip Jones is senior research assistant associated with the climatic research unit of the University of East Anglia in England. He is world renowned as a prominent climatic researcher and he has taken the lead in the past five years in the analysis of worldwide climatic data. His global averages in conjunction with the United Kingdom, United States and world meteorological organizations are used as the world standard.

Dr Jones: I would like to thank the committee for inviting someone from the climatic research unit to come and address it on this issue.

I would say a few words about the climatic research unit, which we refer to as CRU. It was set up in 1972 by Professor Hubert Lamb and it is currently run by Professor Tom Wigley and has been for the last 12 years. We are a semiautonomous unit of the university and we have a staff of about 25 people. We are maintained entirely by research contract money. The university only supplies us with a building and the director's salary, so we have to make all types of requests for research money in order to keep staff.

I wanted to talk today about how climate has changed over the instrumental period. This is the period since about 1850. I want to look at how we can be sure that the changes that have taken place are the result of climate and not the effects of changes in instrumentation and measuring practices and other factors, such as urbanization influences. Then I want to go on to look at the marine regions of the world, since the land areas are only 29 per cent of the earth's surface. I then want to look at recent changes in climate, over the last 20 years or so, and the special pattern of this change.

I was going to talk about long-term variations in precipitation. I think that will involve too much time, so I will omit that one. Then towards the end, I want to look at how general circulation models or large computer models of the atmosphere can be used to give us at present our best estimates of how the future climate of the earth may change as a result of greenhouse gas buildup. Finally, I want to look to see if the temperature change that has taken place over the last 100 or so years is compatible with the models and what we expect to be happening.

Just in a small bit at the end, I want to look at one or two impacts. These are possible impacts in Britain, but you can easily see how relevant they are to Ontario.

I will give you some idea where all the data come from—meteorological stations around the world which record principally for weather forecasting purposes and providing forecasts for navigation, air travel and the like. These data come to climatology second hand from weather use and this is the sort of data set we have available in Norwich of temperature and precipitation. This shows you the stations that have 30 years of data, from 1951 to 1980. We are always on the lookout for extra data, and this includes additional data sets we have managed to

get for the US, Canada, northeast Brazil, parts of Africa and Australia.

This shows the data in a good light. This is data for a 30-year period. If we wanted to look at data for last year, the coverage would not be anywhere near so good, and the stations that are sort of missing in that period will be principally in some of the developing countries, coverage in real time of data. Parts of Africa and one or two parts of South America are particularly poor.

Before we can start looking at climate data, or temperature data in particular, we have to make sure that the data are telling us about the changes in temperature and not telling us other things about the site or the way the temperature data have been collected. The most important factors are that for some locations the location of the instruments changes, the observation times change and the way temperature averages for a month are calculated change. All these can influence the temperature record and induce changes in the record by jumps or trends which are not related to the course of temperature change. So we have to make sure, in dealing with all the temperature data from all parts of the world, that we factor out these influences, ie, make corrections for them and try to eliminate them. In the worst case, you just take those records out of the analysis because they are simply not telling you the true course of temperature change at that particular site.

The most important of the changes in relation to the global warming debate is the fourth one here, which is a change in the environment around the station. This is particularly evident in many parts of North America where, when the records began in the middle of the last century, the towns were fairly small. Now they are major metropolises, and so the temperature that you currently record, say for Toronto, is about 2 degrees above the level it was in the 1850s, even allowing for a slight warming in this part of the world. For the purposes of our analysis we do not use the data for Toronto, simply because they are telling us things about the growth of the city and not about the temperature of the region. We will instead use stations in more rural parts of Ontario around Toronto.

I will just give you an example of this for another place. In order to show this, it is possible to take a rural site and a city site and take a time series of the two stations over the 20th century here and calculate the difference in temperature between the two sites. You take the city site minus the rural site and plot the difference in temperature over the 80 years of this century, and this is the difference between the station that comes out calling itself Washington, DC, which is now a national airport in Washington, and a station about 80 miles south of Washington in rural Maryland, called Princess Anne. Plotting this against time, we see that temperature difference between Washington and Princess Anne increases with time in the order of about two degrees Celsius over the present century. This is again due to the growth of Washington, and this type of station is taken out. So we have omitted stations which show these urbanization trends. Obviously, if a lot of stations are showing an urbanization trend, it may be reflected in the large-scale average and you would see an apparent warming which was not really evident.

1130

The other main problem we have with temperature networks around the world is that there are many more stations reporting in from some countries than from others, so the great density in North America and Europe is considerably greater than in Asia, Africa and South America. In order to overcome

this problem, in averaging station data together to form large-scale and hemispheric-scale averages, we have interpolated the station data from the irregular station network on to a regular latitude-longitude grid so that each area has the same weight in the analysis.

What we end up with, after doing all this work, are averages from the land areas of the northern and southern hemispheres. I will just show you one or two things about this slide, because it pertains to some of the other slides as well. We have time along the bottom here, from the middle of the last century to the present, which has the value in for the last full year, 1989, here. The histograms are the individual yearly values, and the smooth line is a filter which highlights the decadal scale trend in the hemispheric and global series.

When you look at the course of temperature change over the northern hemisphere over the present century and the last century as well, you see temperatures were at a fairly constant level during the late 19th century and the first part of this century, and they rose dramatically during the early part of the 20th century, from about 1920 to 1940. After that time, there was a cooling of a couple of tenths of a degree Celsius to the 1970 period and after that comes a dramatic warming, with somewhat greater year-to-year variations as well. But even now, in the later 1980s, the temperature level in the last five years or so is only just higher than what it was in the 1940s.

When you look at the other hemisphere, you see a somewhat different pattern of change in that you see more of a gradual rise from the 19th century through to the 20th century, and the 1980s are clearly warmer than the 1940s in the southern hemisphere.

When you average the two hemispheres together to form the global picture, you see that, again, the 1980s are clearly warmer, but you have to bear in mind that this principally is a result of a greater relative warmth in the southern hemisphere compared to the northern hemisphere.

I mentioned earlier about urbanization influence. We were confident that we had taken this influence out of our data, but as a result of the intergovernmental panel on climate change, which held one of its final meetings of one its working groups on the science in Edinburgh the week before last, we have done some work with colleagues in the United States, the Soviet Union, Australia and China in comparing estimates of the course of temperature change over the 20th century from our network, which is basically the weather-observing network, and comparing these results with a specifically developed rural network with stations which are known to have been recording always in relatively small towns or rural sites. We have made comparisons in these four fairly large regions. We have made comparisons for the contiguous 48 states, the whole of the European part of the Soviet Union, eastern China and also eastern Australia. These countries were chosen principally because we could get hold of a good rural network. We would have liked to have done the other part of Europe, but it is difficult to get together a data set from all the European countries. The main advantage of doing these areas is that the meteorological service is run by one organization and not by a whole lot of different countries' organizations.

What these results indicated from these comparisons was that over the 20th century, the additional warming in our data set, which is based on basically the weather or the climate network, is in the range of 0 to 0.01 degrees Celsius, and we think that the maximum urbanization influence in our data is of the order of about a tenth of a degree Celsius. It is likely that even this value is an overestimate, because we have chosen in our

study regions where the urbanization influence can be considered to be quite great. Many other parts of the world probably have less of an urbanization influence, and probably the likely value is about one twentieth of a degree Celsius, and this is an order of magnitude smaller than the 0.05 degree Celsius warming which is evident in the last curve I showed. So we think that the urbanization influence, although it is important in series for some parts of the world, is not a major contributor to the global warming that we have experienced over the 20th century.

I have been talking so far purely about land areas. I want to now go on briefly about the marine parts of the world. The top curve is the global land series I showed earlier. The middle curve is a similar analysis based on observations taken by ships since the middle of the last century, principally on the foresight of an American naval captain. He persuaded both the United States and most of the European countries to take weather observations at sea on board ship, so during each watch, merchant and naval ships were required to take weather observations of both temperature and pressure and also whether it was cloudy and things like that. But they also took measurements of sea surface temperature.

In the middle of the last century, this was done by throwing a bucket over the side of the ship, hauling it on deck and measuring the temperature of the sea water with a thermometer. Nowadays, with big supertankers, this is done with measuring the temperature of the sea water that the ship takes on board in order to cool the engines. Over the course of the last 100 years or so, there has been a change from the original measuring practice of using buckets to these measurements made with intakes.

This has led to a major discontinuity in marine or sea surface temperature-time series. There is a considerable correction procedure in order to try to derive this series here, which we believe shows us the course of temperature change over the marine regions of the world and takes into account this change in observation practice, which leads to differences between the bucket and the intake measurements of the order of half a degree Celsius. So it is an important procedural change which we have to take into account in our data if we are going to derive a consistent time series.

A major change took place around the beginning of the Second World War, and if we had not corrected for that, there would be a major jump of about half a degree Celsius in this time series around 1942. But we have made corrections for that.

1140

The bottom curve shows the combination of the land and the marine data and shows similar features to what you saw in the land record. However, the year-to-year variations, once you incorporate the marine data, are somewhat damped down. They are nowhere near as great as in the land alone record.

As you see, the temperature level in the 19th century was fairly constant. There was a rise up, and the 1980s are clearly the warmest decade. The dotted line here is another analysis simply on land data, which is often quoted, produced by Hansen and Lebedeff at the Goddard Institute for Space Studies in New York. If you follow these two smooth curves along, you will see that the overall warming on the century time scale is somewhat greater in the Hansen and Lebedeff curve than in our curve. Our overall warming is about half a degree Celsius; theirs will be slightly more, possibly up to 0.7 degrees Celsius. We think that their analyses are somewhat less rigorous than ours, partly because they have not corrected all the land data,

and they do not use marine data. They are basing their results solely on land-based estimates.

When you look at this curve, I want to look at this period over the last 20 years or so, when we have seen some fairly strong warming in the record, from the late 1960s through to the present. One reason for looking at the special patterns of this warming is to see if the patterns that are occurring are in accord with what some of the models suggest should be happening. I will briefly say what the consensus from some of the models is and then show you what the data say.

I will just give you an example of one model here, and I think you have heard about general circulation models earlier, but what has been done over the last decade or so in general circulation modelling is that the computer-based model of the atmosphere has been developed which solves all the equations of motion in the atmosphere. The model is run to try to simulate the present climate, with a level of carbon dioxide at maybe 300 parts per million. That current climate is then compared with reality to see how well the model simulates reality, and improvements to the model are often made, because the model is deficient in many areas.

The model is then changed. The carbon dioxide concentration, for example, or the equivalent carbon dioxide concentration, in line for the other non-CO₂ greenhouse gases, is doubled and a new climate is produced by the model. The new climate, or the perturbed climate with twice the CO₂ level, is then compared with the previous run of the model which had only 300 parts per million of carbon dioxide in the atmosphere. This top slide shows the difference between the two climates in terms of temperature for one particular model—it is one of the United States models—and you see the changes in temperature as a result of doubling of carbon dioxide.

Most of the models produce things similar to this, in that as a result of the doubling of CO₂, the models produce a warming of the order of about four to five degrees Celsius. This warming tends to be much greater in the polar regions than in the tropics. The same would occur in the southern hemisphere as well, the greater warming in the Antarctic region as opposed to the southern tropics and subtropics. This is a fairly consistent agreement between models in terms of temperature. There is much less agreement in terms of precipitation change, but in terms of temperature change, the models suggest that there should be a warming of the order of about four degrees Celsius for the doubling of CO₂ and this warming shall be amplified in the polar regions.

I want to look at the recent warming patterns and see how they conform to that.

Using our data set of temperature from land and marine data, we can work out at each point on the earth the trend of temperature over the 20-year period 1967-86. This is the period when the northern hemisphere has warmed by about two tenths of a degree Celsius.

This is a polar map, and coming from Britain, I centre myself on the Greenwich meridian, so that is down at the bottom here. Canada is off to the left. You see that over this 20-year period, although the northern hemisphere has warmed slightly, there are still patterns and still regions which show quite strong cooling over this time. There are also regions which show strong warming.

The strongest warming has occurred in the northwestern part of Canada and Alaska, warming up to almost two degrees Celsius in parts of the Yukon. There is also a strong warming in parts of Siberia, extending over towards Spitzbergen in northern Greenland. But there are two major areas of cooling, the largest

in magnitude in the north Pacific region, encompassing Japan, and a cooling over the north Atlantic region from eastern Canada across through Iceland up to Scandinavia and Britain.

Many people have written to me, particularly from Scandinavia, saying: "Where is this global warming? Scandinavia is getting cooler." You can easily threaten them with this type of information and explain to them that the global warming trend we might have experienced over the 20th century is an average of the whole world and there is no one region which we can pick out as being representative of global conditions.

We saw a strong warming in the other hemisphere, and here the warming is greater. It is of the order of three to four tenths of a degree Celsius at this time in the southern hemisphere. But there are still small areas of cooling in the Amazon basin area, parts of Antarctica, in the south Pacific and in New Zealand. But there is strong warming in many middle- to low-latitude areas of the southern hemisphere, particularly in the east equatorial Pacific and in the Indian Ocean, from Australia right across to South Africa.

If you just go back to the other slide, we mentioned that the models suggest that the strongest warming should be in the polar regions. If you look in the northern hemisphere, the strongest warming does look to be in the polar regions. Although we have cooling in the North Atlantic sector of the Arctic, there appears to be a fairly strong warming in the Alaskan sector of North America and also in the Soviet sector of the Arctic. But in the other hemisphere that is not the case. There is a slight warming in the Antarctic region, but it is not that great. The strongest warming is by far in the middle latitude areas of the southern oceans, particularly the Indian Ocean and the eastern Pacific.

1150

Now the other period, which I mentioned earlier, when the northern hemisphere showed quite strong warming was the period from 1920 to 1940. We can repeat the exercise for another 20-year period, which is the period of 1920 to 1939, doing the same thing. Here we see the strongest warming now is in the polar region, encompassing Greenland and covering parts of northern Canada and most of the Soviet Arctic. But even in this period, when the northern hemisphere warmed by almost four tenths of a degree Celsius in a fairly short time, there is still strong cooling in parts of Soviet central Asia and also in central Canada, particularly around Hudson Bay. So when you look at the global figures, the global trend, you have to bear in mind that the spacial detail is unlikely to be the same as in the global series.

One interesting feature in the pattern of temperature change over the last 20 years or so has been the dramatic change in temperature over the Alaskan region, which I highlighted on the slide earlier. This is this dramatic warming up here in Alaska and the Yukon and this dramatic cooling just a bit further south in the North Pacific region. This is North America here. One of the major features of the North American circulation system is that in this area just south of Alaska and the Aleutian Island chain there tends to be a low-pressure centre throughout the year, and for the last 10 years or so, since the late 1970s, this Aleutian low has been much deeper and slightly further south than in the previous 40 years.

If you show the time series of the strength of the Aleutian low, which is the average pressure over the North Pacific from 1946 to now, you will see that this has gone along fairly consistently until about 1976. There was a dramatic drop after that time. This has led to a much deeper Aleutian low during this

time, which has advected warm air up into northwestern Canada and Alaska, bringing warm conditions, particularly in the wintertime, and obviously enhanced snowfall. On the other flank of this, this has brought cool air down off eastern Siberia towards Japan and the northwestern parts of the Pacific Ocean.

So most of that major feature of temperature change in the North Pacific can be explained by a change in the circulation in the North Pacific. While it has been postulated that it is due to global warming, it is really due to a change in the circulation. It might be just moving the question one step further ahead. It may be that the change in the circulation is due to global warming. It is difficult to really answer that one, but we can obviously follow it back to see the change in the circulation.

Looking at how we might say what the future climate might be like in certain parts of the world, the general circulation models which I mentioned tend to give information on this type of resolution, a fairly coarse resolution. The model may be running with a resolution which is typically in a good point notation of five degrees of longitude by five degrees of latitude. So it is extremely coarse, particularly if you live in a small country like Britain, which may be only a couple of grid points.

I want to show you how one model performs in Britain. I will pick the British model. The reason for showing you this is that you have to pay particular caution to what models suggest about the future. The top picture shows the annual cycle of temperature. The one with the dots is what currently happens in Britain. The model that simulates British climate now is the thinner line, and in the perturbed world, when there is twice the CO₂, the model simulates about a four-degree to five-degree rise in temperature in Britain. Notice how in the control climates, the simulation of the present climate and the perturbed climate model, there is just basically a warming throughout the year, but the real climate does not have that amount of annual cycle.

So I have little faith in the model in simulation for Britain, simply because it cannot simulate the present annual temperature cycle in Britain. The situation is much worse if you look at precipitation. In Britain there is very little of an annual cycle in precipitation. It is wet most of the year, but the model in the controlled climate simulates quite a strong seasonal cycle of precipitation with a summer maximum. The perturbed model just follows that and amplifies it. Because of this type of thing, when you go down to the very small grid scale of the general circulation models, it leads one to question their use for future scenarios.

If you want to find out where the current British climate from the model should be, this particular climate has currently experienced summer in southern Germany, nowhere near Britain.

Mrs Grier: Can I just be sure I understand what that is? The model lines you are showing are extracted from a model that is based on the globe and you are applying it to England and finding it does not match reality?

Dr Jones: Yes, and this tends to give you a lack of faith in the future projections for Britain, because the current climate is not simulated very well.

The reasons for this particular problem with the models are well known in that the models have to use a fairly simplified model of the ocean and they are also particularly poor in the way they simulate clouds, and also sea ice. Obviously future research is concentrating on those areas, trying to improve those factors of the model, but in the short term I would consider quite a good bit of restraint when you use these types of

scenarios of the future from the current models. They could considerably change in the future as models improve.

1200

Finally, I want to look at how the course of temperature over the 20th century conforms with what the models suggest should be happening.

The general circulation models just tell you about two states of the climate, the present state and some future state when CO₂ levels have doubled. We would like to know with these models how they simulate the year-to-year changes in climate. At present, it is not possible to do that with the general circulation models. It may be possible in a couple of years' time, as models improve and particularly when computing power becomes much greater, but in order to look at this problem, we have developed in Norwich a small, simple model of the world which does not consider geography. It just considers boxes. The model has a box for the land area of the northern hemisphere, a box for the southern hemisphere and a box for the two oceans in both hemispheres and allows interchange of heat between the various boxes forced by changes in greenhouse gases and their effects on the radiation balance of the planet.

This wiggly line is our global temperature curve. I have superimposed on that two runs of this simple model, one assuming that for the doubling of carbon dioxide the equilibrium response of the atmosphere is a temperature change of 1.5 degrees, which is on the low side of what the models say, and one with a much higher response or a greater climate sensitivity to greenhouse gases, of 4.5 degrees Celsius. So these two smooth plots encompass the current range of sensitivity of the present models.

You can see that the real world varied a bit in the 19th century. There was this warming in the 1920s to 1940s, then a slight cooling and then a rapid warming in the last 15 years or so. If we were to have stopped the curve here, we might have said that the climate seemed quite sensitive to greenhouse gases. We are up here near this 4.5 degrees doubling temperature. This was put forward in the late 1930s, that this dramatic rise in temperature of the 20-year period prior to that was the result of greenhouse gases. The theory fell away, or for the lack of interest the theory waned, after the Second World War because temperatures were seen to be cooling slightly. Now the interest in the greenhouse gas theory has increased again because we are suddenly in a warming phase, but we seem to be much nearer the lower estimates of a climate sensitivity, so a doubling temperature of maybe only 1.5 degrees Celsius.

One reason that we cannot really associate this warming with the greenhouse gas buildup at this time—there has been a warming that is significant; it is about 0.5 degrees Celsius. Is it due to greenhouse gases? It could be, but again, it could not be. It might be; it might not be. The one problem is that if we take our simple model and just give it random forcing, a sort of mean forcing due to the sun's output, and if we run the model for thousands of years, we find periods in the past—this is just random years—when the model, because it models the ocean, albeit in a fairly simple way, induces periods of cooling and warming just simply due to random forcing. So we can conclude from this that the real world has quite great natural variability.

The big problem with the warming that has occurred over the last 100 years or so is to make sure that it is not just simply due to natural variations, or whether it is due to greenhouse gases or some other cause. We just cannot be sure at this time. We really need the warming to become much greater in order

that it goes out of the bounds of variations that we can pick up in our simple climate model run with random forcing.

Just in conclusion now, the world has warmed by 0.5 degree Celsius over the last 130 years. The 1980s are clearly the warmest decade. The magnitude of the warming is broadly consistent with the predictions of climate models, but at present it is not possible to attribute all or even part of the observed global warming to the greenhouse gas rise. There is, however, no observation evidence that directly contradicts the models.

If the sole cause of the warming were the greenhouse effect, then the climate would appear to be fairly insensitive to greenhouse gases, ie, near the lower end of the postulated doubling of the global temperature, ie, 1.5 degrees. But we have to bear in mind that if we are going to say that the climate is fairly insensitive, there could be a much larger greenhouse warming which has been partially offset over the last 100 years by some natural variations and other factors. So we cannot rule out a much higher climate sensitivity than the 1.5 degrees.

It seems from the data that the climate system is less sensitive to greenhouse gas changes, say, near 1.5 degrees to two degrees, than the models would suggest, but it could be that there is some natural fluctuation going on, which would have induced a cooling if there had not been the greenhouse gas buildup.

Detection of the greenhouse influence, which we are unable to do at the moment, is important for a number of reasons. This would help us define the magnitude of the effect, it would give us much greater confidence in the models and their projections into the future, and it would almost certainly give a spur to policy measures to reduce the effect.

One important thing about the models: They are telling us about some time in the future when CO₂ levels have doubled and when the climate system has responded in an equilibrium fashion. What this means, though, is that we could be, because of the oceans mediating the atmospheric response to greenhouse gases, at this time just experiencing the greenhouse gas buildup to some time about 20 or 25 years ago. If we introduce measures now, it might be 20 years before we see any effects in temperature or a slight slowing down of any warming. What this means is that the longer the time before we actually have detection and policy measures start—there is a greater commitment to future climate change and future temperature increase as the time delays.

1210

Just one final slide, which might be very parochial to you, just trying to look at what the impacts might be. In England we have an extremely long record of temperature; in fact, 300 years. If we look at that temperature distribution—this is now in summer—from the warm summers here, the cool summers here and the majority of in-between summers in the centre here, the warmest summer we ever experienced in England was in 1976. If we assume that the temperatures are going to increase and we see there is no change in the variability, it means that this summer, 1976, which had a one-in-1,000 chance of occurrence with a 2.1-degree temperature rise, becomes a summer that occurs one in three times. I will finish on that point.

Mrs Grier: I just want to be sure I grasped at least some of the presentation. Your conclusion in your second-to-final slide there: Am I correct in interpreting it to mean that the longer we delay, for whatever reason, taking some action, the more difficult it is going to be to mitigate the effects of global warming if in fact it is determined that global warming is due to rises in CO₂?

Dr Jones: Yes.

Mrs Grier: We have heard some other witnesses comment on the difficulties with the models. There is, I take it, a school of thought that says, "Delay action until you're sure." The other argument we have heard from some people is that the risk of not taking action is so great that one needs to take action. I just wondered where you fell in between those two extremes.

Dr Jones: Obviously there is the point that we would like to take action if we are sure that the temperature rise is due to greenhouse gases, but I think it is going to be some time—it could be up to 10, 20 years in the future—before we can be absolutely sure that the rise in the temperatures we have experienced is beyond the natural variations that we have experienced in the past. By then, we would have put so much more CO₂ and other trace gases into the atmosphere that the temperature rise might be even greater. We ought to be thinking about making cutback measures now, simply because it will be easier now to take action than some 20 years down the way.

The big problem, though, that that entails is if countries like Canada, America and Europe take action, they may cut back in emissions and slightly reduce the total CO₂ emitted. It may be that that will be taken up by development in the Third World as these countries industrialize. Maybe we are just buying time and slowing the thing down.

Mrs Grier: And you feel it is worth while doing that.

Dr Jones: I think it has to be worth while doing that. I do not know what you have heard about impacts and the measures. I am sure if you ask anyone in the street in Britain whether he would like summers like 1976 to recur in the future, everyone would say yes. There would be a dramatic reduction in people going to Spain for their holidays and things like that, but the farmers do not want summers like 1976, because they have dramatically reduced income, and the water resource planners do not want summers like that.

Mrs Grier: We have heard some of those arguments. Thank you very much.

The Chair: Your measurements are clearly models of actuals in comparison to scenario-building in the future. Do you also engage in the future scenarios?

Dr Jones: Yes.

The Chair: In working with the future scenarios, how do you work with some of the modellers from other institutions? Are you in close contact with them in terms of their measurements? I know that you are the foremost modelling area that is working with the actuals, but are there other places that are doing that as well?

Dr Jones: There are two other places that are looking at observed temperature changes over the last 100 or so years. There is a group in New York, the Goddard Institute for Space Studies, and another group in Leningrad, at the Soviet hydrometeorological centre, but for the models there are a number of modelling groups in North America and also in Europe and Australia, and we have contact with most of them and are able to get their scenarios for the future, their present climate models and the results of their present climate models. We can then look at the various modelling results and compare the models, and also compare the models with reality. We compare them not only for temperature but also for precipitation, for how they simulate the present circulation patterns and the sea ice distribution and things like that, and see how well they fit

reality. We have a project with the Meteorological Office in Britain whereby we are telling it what is wrong with its model, and in time that will lead to improvements to the model. We have similar things going with the American groups as well.

The Chair: I was struck with the chart that showed the actual temperature change and the precipitation models being quite different from what the scenario modellers had produced. I wondered if you were working with your own or if that came from other sources as well.

Dr Jones: You would find similar things if you looked at the other models too. They may not be quite so bad for temperature in Britain, but they would show a similar pattern in rainfall. Most models tend to show an enhanced seasonal cycle of precipitation in Britain, particularly with summer maximum, which does not occur.

Mr Callahan: In Britain, considering that there are a good number of bogs and so on, is there a significant amount of methane in the atmosphere in England?

Dr Jones: It is no different from what it is here. The gas mixes completely around the world. If you release methane in Ireland, say, then it would very quickly reach right down to the south pole within two or three years.

Mr Callahan: I am thinking in terms of, have there been measures made of how much methane is coming from the natural resources in England? Let me tell you where I am coming from. We talk here about the question of landfill as being not a wise method of disposing of waste because it increases the amount of methane gas that is released into the atmosphere, and we understand that methane is an even greater absorber of heat than CO₂. So what I am asking you, I suppose, is, have there been measurements made in England as to the amount of methane that is emitted into the atmosphere as a result of natural phenomena?

Dr Jones: There is a measurement program currently being undertaken by the National Research Council in Britain to try and estimate that. It is not really in terms of the greenhouse gas problem, though. It is more in terms of just an environmental problem, because there are so many of these sites in Britain that we just cannot know where they are. Where they are known and where there is a large quantity of gas emitted, it is far better to burn it off and turn it into CO₂ than release it as methane, simply because as CO₂ it has less of a greenhouse effect than it does as methane.

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Mr McGuigan: When you finished your presentation and you talked about it being the warmest summer in 1976, you made a comment about one in three. I did not understand that. I just wonder if you could go back to that.

Dr Jones: If you follow the top curve, the average temperature in summer in Britain is 15.3, and you have a distribution of these summers around this mean, so you have a chance of a warm summer occurring with a certain probability, more than a cool summer. The assumption that most climatologists make is that when you increase the temperature, you are not going to change the variability. That is a major assumption—it may increase the variability, it may decrease it—but it is the best assumption you can make at the moment. If you are currently here on today's distribution, by increasing the temperature, you are just moving the mean up into the likelihood of a summer occurring with a temperature similar to 1976. It just increases, until

by the time you are up at 2.1 degrees above the present mean, that summer is occurring one in three times.

Mr McGuigan: So the conclusion is that summer is due more to chance than it is to any outside influence. Is that the conclusion you reach?

Dr Jones: No; but as you increase temperatures, you have more likelihood of warmer extremes occurring. One way of getting this across to the public is to try and say how much more chance there is of a summer like the warmest one we have ever experienced recurring. People think it is a one-in-1,000-years event. If it is going to suddenly start increasing more and more, they are going to want to know why. So we can show this type of diagram and try and explain it to them.

Mr Charlton: Is it one in 300, roughly, versus one in three?

Dr Jones: It is almost one in 1,000 when you plot the distribution, but because you have only 300 years of data, it is like one in 300 as opposed to one in three, yes.

Mr D. R. Cooke: Are you saying that by the year 2050 it will be one in three?

Dr Jones: By 2050, given a scenario of future greenhouse gas emissions, which we have assumed here to be business as usual—i.e., no dramatic changes in the amount of greenhouse gas emitted—this summer will occur one in three times. That does not necessarily mean that it will be a summer like 1976. It will be a summer like 1976 for temperature, but it may be a different precipitation distribution. But obviously any summer like 1976, if it is going to recur much more frequently, is going to cause severe problems for farmers and the water resource people.

Mr McGuigan: Is that not kind of a self-fulfilling prophecy?

Dr Jones: How do you mean?

Mr McGuigan: If we are in a warming trend, then we are going to have a hot summer.

Dr Jones: Yes. Obviously you could look at the reverse side of this and look at cool summers and cold winters, like the cold winters that we occasionally experience in Britain. They just cannot occur by the time you get to 2050, because you have shifted your temperature increase so much that they just cannot occur.

Mr McGuigan: Now I am totally confused, because I thought the thrust of your presentation was that the models are not really showing this rise in temperature, at least not to your satisfaction.

Dr Jones: The observations are not showing such a great rise in temperature as the models would imply should have occurred by now. If we think that there is some preindustrial time when temperature was at some constant level, the models say that for a doubling of CO₂ there should be a rise of about four degrees. We should have expected a rise now of about one degree; we have only had half a degree. Therefore there is something wrong with the models, our understanding or the data. We are fairly confident with the data; therefore, maybe the models are giving somewhat of a greater response of the climate system to greenhouse gases than in reality is occurring.

Mr McGuigan: I followed you through that part, but then it seems to me that you jumped to a different conclusion when you came to the warm summer of 1976.

Dr Jones: I was then assuming that, let us say, the climate system is not as sensitive to greenhouse gases as the models suggest. Maybe it is sensitive to a temperature of about one and a half to two degrees for a doubling. Then I was just showing you what a two-degree temperature change would mean to a summer in Britain, because people think of two degrees as not that much, but the range of variability in British summer temperatures is only about four degrees from the warmest to the coolest. In other parts of the world climate variation from year to year and season to season is much greater, but in Britain it is a fairly maritime climate, so you do not get much variation from the warm to the cold summers.

Mr McGuigan: Got it now.

Mr Pollock: I asked this question of Ontario Hydro people, and in some areas they were a little vague. Is there any way of filtering the air so that you can take CO₂ out of it? They mentioned the fact that you could take it out but it was going to cost a lot. I just want to know, is there any way?

Mrs Grier: Grow trees.

Mr Pollock: Well, grow trees, but other than that?

Dr Jones: I am not really sure on this.

The Chair: I am not certain, Mr Pollock, if this is Dr Jones's area of expertise. He may not want to comment. We could have a briefing for you from Dr Harvey later on this issue.

Mr Pollock: Okay.

The Chair: I wanted to conclude with a question. How do you react to other scientists who make the argument that the modelling is so unsure that this science is almost described as mad itself?

Dr Jones: I would answer that the models are doing the best they can at the present. I would suggest, though, that possibly the results are sometimes overinterpreted by people looking at what the impacts might be, although that is sort of led by people wanting to know what the impacts are going to be in various sectors of the economy. I am fairly convinced, on a personal viewpoint here, that the rise of temperature that has occurred is due to the greenhouse effect. I think that is the most likely cause of a number of factors, but I do not think the climate system is quite as sensitive as some of the modellers would have us believe. I think that in the next few years, as modelling improves, we are going to see the doubling temperatures reduced somewhat from about four degrees possibly down to as low as two, to somewhere in the region of two to three. Does that answer your point?

The Chair: Yes, it does. I think it is a very useful way to end these sessions. Dr Jones, I think that on behalf of all of the committee I can say that this has been a fascinating and very useful presentation. It is the first modelling approach that we have been exposed to and may be the only one, and it was certainly very worth while. It was really educational for all of us.

We are going to adjourn for lunch. We had been going to leave the building, but because of the time factor we are going to have lunch in the legislative dining room, and we are asking the committee to join us for that today. We will adjourn now until two o'clock.

The committee recessed at 1230.

AFTERNOON SITTING

The committee resumed at 1405.

CANADIAN FORESTRY SERVICE

The Chair: Our first witness for the afternoon session is Dr Peter Hall, who is with the Canadian Forestry Service. Dr Hall began his forestry career in 1968, starting in Newfoundland with Forestry Canada as a specialist in reforestation problems and tree breeding. In 1976, Dr Hall received his PhD in forest genetics at the University of Aberdeen in Scotland. He returned to Canada and was appointed the national adviser in silviculture, tree breeding and biotechnology. In May 1989, he undertook his current position as the co-ordinator of environmental issues, including global warming, for Forestry Canada. Welcome to the committee, Dr Hall.

Dr Hall: Thank you. I have a few slides which I will show as I go through my presentation. What I plan to do is to go through my presentation, which should take about 15 or 20 minutes maybe, and then I would be pleased to answer any questions that the committee members might have.

There is good scientific evidence to suggest that the world climate is changing, with a strong and sustained warming trend more pronounced in northern latitudes and in continental climates. The degree of warming is projected to be greatest in the provinces north and west of Ontario.

The first slide just gives a diagrammatic presentation of how global warming operates. The large yellow arrow is the incoming radiation from the sun. It gets reflected back into the atmosphere. Most of it gets absorbed by either the surface of the earth or by the gases that surround the earth, and the degree or the extent to which this energy is reradiated back into space depends on the types of gases and the concentration of those gases.

The theory behind the greenhouse effect is that the concentration of carbon dioxide, nitrous oxide, CFCs, methane and other gases is increasing—that we know, because we have been measuring them—and therefore more of the heat from the sun would be trapped close to the surface of the earth.

For the forest ecosystem, the transitional period of change and adjustment appears to pose more hazard than benefit, in part because changes will occur within a shorter time than forest managers are accustomed to dealing in. The time for the change is a matter of a few decades rather than centuries, as has been the case. Increased air temperatures, coupled with reductions in soil moisture, could reduce the productivity of our forests. It is also possible that higher temperatures and increased levels of carbon dioxide may result in increases in growth in some parts of the country.

This map shows the different forest regions in Canada. These forest regions have been classified on the basis of species composition and they reflect the current climate. The lower pink area is an area of mixed hardwood and softwood forest. Below that is a small area of pure hardwood forest at the extreme southern end of Ontario. Above it, the dark green is the boreal forests, which run from Newfoundland right through to Alaska. The light green area is an area of forest tundra and open forest. As I say, these boundaries reflect the current climate conditions, and presumably, if the climate change theories are proven correct, at some point in the future these forest ecosystems will be out of phase with the climate.

What I have done is try to address about a half-dozen issues and to show or to indicate to you what the effects are projected

to be and what actions we might take to reduce the impact of those effects.

There will be major effects on forest ecology. The climate and soil conditions largely determine the composition of forests. Significant climate warming will create suitable conditions for boreal forests to grow farther north into the Northwest Territories and into northern Ontario and Quebec. The large peat land areas of northern Canada may some day become productive forest lands. We are assuming that these changes will come about as a result of higher temperatures and in some cases considerably lower soil moisture.

The effects on forests from this will be from drought. There might be some effects from increased levels of carbon dioxide. We are expecting an increased extent in the number of wildfires, increased damage due to insects and diseases and problems in carrying out artificial regeneration in our forests.

Forest trees are continually under some sort of stress. This is just a list of some of the things that impinge upon the forest ecosystem and which affect forest productivity. Today we will be looking at the two on the right: climate and, to some extent, weather patterns.

At the same time that the conditions for the boreal forest make it better for growth in some areas, the tolerant hardwood forests could advance into the southeastern portion of the current boreal forest. Both effects could be expected to have major impacts on Ontario.

This is an example of some of the large peat land areas in the northern boreal tundra forest zone. This one has been drained and trees planted on it as an experiment. In the background, you see an undisturbed peat land with some forest in the far distance. This is typical of the northern boreal forest.

This is the forest that will probably be most greatly affected when climate change comes. This is a typical southern Ontario hardwood forest, and much of Ontario could have conditions which are more suitable for this type of forest.

Tree growth rates may also increase as a result of longer growing seasons and higher concentrations of carbon dioxide.

Mr Callahan: Excuse me. Why are the yellow ribbons around those trees? Are they being cut?

Dr Hall: Not in that particular stand. They are being measured. That one was part of an experimental plot and they were being assessed for their height and stem quality. It is part of the breeding project.

Mr Kerrio: There is a song, Tie a Yellow Ribbon Round the Old Oak Tree.

Mr Callahan: That did go through my head, but I did not think that was what it was.

Dr Hall: I promise not to quote any songs.

Tree growth rates may increase as a result of longer growing seasons and higher concentrations of carbon dioxide. Increased carbon dioxide may also reduce transpiration rates in trees, enabling trees to adapt better to a drier environment.

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We know already that seedlings respond to increased concentrations of carbon dioxide by growing somewhat faster, but we do not know if this also affects mature trees. If we end up, for instance, with less snowfall in winter and we still get the same level of frost that we do now, this frost could penetrate

deeper into the soil and kill tree roots. We know that this does happen, and we have been able to demonstrate it experimentally. We may be seeing something of this now in the damage to the maple forests and other hardwood forests in eastern Canada.

One adaptation strategy for all this would involve the use of intensive forest management, including genetic manipulation, to enhance growth rates and variability within species to better enable these species to tolerate new conditions. Shorter rotations may be possible, which would reduce the period of time that the trees are under stress.

Changes in climate can also be expected to affect the way we harvest our forests. Large areas of forest land which are low-lying and wet are harvested every year. If you run machinery over these areas, it damages the site tremendously, to such an extent that reforestation of these areas would be almost impossible. Therefore, these areas are harvested in winter, when they are frozen and when ground disturbance is kept to a minimum. If winter temperatures rise, these areas could be frozen for shorter periods. This would mean you would have to completely change your harvesting practices, something which is possible, of course.

Harvesting forests in areas where precipitation is now limited could aggravate drought conditions on these sites and further reduce soil moisture. In some cases, harvesting patterns can somewhat compensate for this, but some of these forest lands will not support a forest if water becomes more scarce and some of these forests may have to be harvested in the full knowledge that they are lost to commercial forestry.

Reforestation is another thing which will be greatly affected under conditions of changed climate. Currently there are just over 200,000 hectares of forest land harvested in Ontario, approximately half of which is regenerated artificially, either by seeding or planting. Increased soil moisture deficits may cause failure of natural or planted regeneration, because during establishment of a new stand, water is usually the critical factor in determining whether the new seedlings live or not.

Broad-leaved weeds are expected to benefit greatly from increased carbon dioxide concentrations, because they can be expected to grow faster and more vigorously under these conditions. This will almost certainly cause problems, as many of these weeds can choke and smother small seedlings.

One approach to adapt to these changes is to introduce new species better suited to the changing climate. This is already practised in European countries. Sweden is a good example where they have introduced a lot of lodgepole pine from similar latitudes from Canada. In Canada we have done a fair bit of this type of work as well. In one case that I am particularly familiar with, we were growing Sitka spruce from coastal British Columbia in coastal areas in Newfoundland which were of roughly the same latitude but much colder. Here a very small proportion of these trees adapted very well to these changed conditions.

One of the things that it does tell us about the way we handle our forest trees is that we are really not completely aware of the degree of variability that is in these trees. It is this large degree of variability, especially within our conifer species, that would enable us to adapt to changed conditions, because we could select trees for particular characteristics, such as trees which are particularly drought tolerant or which grow particularly quickly in their early years.

There are a number of exotic species which also grow well in Ontario forests. At the present time it is somewhat risky to recommend species other than those currently used, because they will have to grow and survive under climatic conditions

similar to today's for many years but will mature under conditions of somewhat different climate. In order to adapt, we are going to need better data on the micrometeorology of the forest and on stand dynamics of currently developing forest ecosystems.

We can expect climate change also to have very large effects when it comes to the protection of our forests. If the climate warms, the frequency and intensity of dry periods will probably increase and greater amounts of fuel are expected to be available from trees which have been stressed from other reasons. This will all presumably result in more and larger wildfires.

It is worth noting that the five warmest years in the last century all occurred during the 1980s. From the 1970s to the 1980s, the average area burned in Canada doubled, from one million to two million hectares per year. In 1989 the total area burned in Canada exceeded six million hectares, triple the average for the past decade. We cannot be entirely sure that this is a cause and effect relationship, but the fact that these two factors occur together makes a lot of people think they are seeing the first impacts of changes in climate.

While climate warming may be the underlying cause of the shift of forest boundaries, forest fires will likely be the mechanism that accelerates this process. Losses are expected to be greatest in softwood forests during this period, and this in turn could further aggravate the global warming by releasing large quantities of carbon dioxide into the atmosphere. In order to adapt to these conditions and reduce the incidence and severity of fire, we may be able to divert additional resources into our firefighting detection and suppression systems, which are quite well developed in Canada.

Another effect on forests is that due to insect and disease. Changes in climate will likely affect the distribution of insects. We know that a very destructive pine beetle in British Columbia, for instance, is limited in its distribution by temperature. During the last 15 years, the area in which this beetle has been causing damage has increased quite significantly. Again, this may or may not be cause and effect.

A major pest in Ontario is the eastern spruce budworm, which caused an average annual loss of timber during the high-outbreak period of the late 1970s of approximately 12 million cubic metres. Combinations of warm, dry springs result in increased feeding by the insect and increased rates of reproduction, both of which could be aggravated under the current climate warming scenarios.

As in the case of fire, there is a good infrastructure in Canada for coping with large-scale insect outbreaks. In response to a need, they could be reinforced with extra resources. From a strictly scientific viewpoint, we may be able to make use of these changes in insect distribution to give us an idea of how fast and where changes in climate are occurring.

Another area which will be affected is the utilization of our forest resource. Utilization of forests is intensifying in boreal areas, a trend which will increase as we approach the limits of cutting in these areas. As a result, there will be a need for greater management intervention to develop new uses for the wood that will remain in these forests and wood which may be of a different quality than that which we are harvesting now.

Under projected changes in climate, we will no longer have an equilibrium state for climate and no state of equilibrium in the forest ecosystem. Some resource-based industries may be able to locate farther north as the climate warms, but there will be a general separation of the resource base and the processing facility, which may leave some of the 300 or more communities

now dependent upon forests in a somewhat more precarious economic position.

As the climate becomes warmer in the north, lands presently marginal for agriculture may become more productive. They may have to be used in place of the drier and less productive agricultural land in the Canadian Prairies. This could create land use conflicts with agriculture encroaching on existing forest lands. However, except for the soils in the clay belt, most boreal soils are not suitable for agriculture and neither agriculture nor forestry can become established on many of the rocky and shallow soils of the Canadian Shield, even under conditions of so-called improved climate.

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Finally, I want to talk a little bit about some ways in which forestry can interact with the whole global warming issue. The increasing concentration of carbon dioxide is attributed mainly to fossil fuel emissions and, to a much lesser extent, deforestation. Forest ecosystems can help reduce a global trend of increasing carbon dioxide by containing and/or removing a portion of the carbon dioxide from the atmosphere and fixing it in wood or wood products.

Forestry can have an effect in the following areas. First of all, we could use forest biomass to generate electricity. According to a recent study of methods of electricity generation, the growing, harvesting and burning of woody biomass to generate electricity actually takes more carbon dioxide out of the atmosphere than is released by biomass combustion. This would allow reduction in the consumption of fossil fuels, which are the largest single contributor to the source of carbon dioxide.

Second, we can preserve what we call the carbon sink. This carbon sink is in the form of large stores of carbon in boreal and Pacific coastal forests, in forest soils, in the permafrost and in the peat lands. Reforestation and afforestation can be increased to restore carbon reservoirs and so create healthy, rapidly growing plantation forests. Various estimates have been developed as to the effect of forestry as a tool to mitigate global warming, but most of these studies suggest that forest-related efforts have a net effect of approximately five per cent in reducing carbon dioxide in the atmosphere. This indicates that forestry can be a partial solution but certainly is not the cure-all and on balance may have little effect on global warming. The main interaction will be the impact of global warming on the forest, not the other way around.

One of the greatest effects of using trees on this issue will be in urban environments, where they cool houses and reduce the use of energy for air-conditioning. In these situations, trees do make a real contribution.

Finally, another way in which forests can be used to address the global warming issue is the maintenance of this carbon that is sequestered in wood. This can be achieved by the replacement of high-energy input products with wood products which will lock up carbon. Many products—furniture, construction, packaging—are made from materials which consume far more energy to produce than if some of these items were made of wood. Examples of high-energy inputs are in the making of plastics, concrete, steel and aluminium. If wood replaced these products, it would lock up carbon dioxide in the long term and reduce, at the same time, the amount of energy we consume. Needless to say, this has large implications in the public policy sector.

These are some of the effects that we can expect to see in our forests as a result of climate change and some of the ways

in which we can use forestry to try to make an impact on the entire global warming issue.

This is an example of damage in a Canadian forest. This particular one is insect damage, an insect which attacks only one or two species, but you can see what happens. There is part of the forest which is being stressed to the point where many of these trees will die. That might be what heavily stressed forest would look like under some of the climate scenarios that have been developed.

This just shows some of the time horizons which we have been accustomed to dealing with. A forest crop probably lasts about 75 years, so if we establish a forest crop now, we are stuck with it in some sort of fashion for the next 75 years. Until now, the atmosphere has taken centuries to change. That is one wheel size that may change in the near future. We may be looking at decades instead of centuries.

Mrs Grier: Which political jurisdiction do you have in mind for that five-year time frame?

Dr Hall: There is none listed.

Mr Callahan: I wondered why there are the two big wheels. Is there some significance to that?

Dr Hall: I scrounged that from somebody on the minister's staff. I do not know; maybe there is a deeper hidden meaning there that eludes me as well.

If members have any questions on anything that I have said or something that I may have missed out here, I would be pleased to try to address them.

The Chair: Yes, indeed. I have a list of questioners for you, beginning with Mr Cooke.

Mr D. R. Cooke: Dr Hall, if I am understanding what you are saying, this has been a much more optimistic presentation than some of the ones we have heard so far. We have heard some global suggestions that the increasing rate in carbon dioxide is so great. One witness said we should be contemplating planting 1,000 trees a person a year just to try to counteract the problems. You seem to be suggesting that, at least in Canada, some of this is going to happen naturally. Is that accurate? Am I understanding you right?

Dr Hall: By "naturally" do you mean the forest development?

Mr D. R. Cooke: Yes.

Dr Hall: Forests do normally regenerate themselves. They have been doing it without intervention for a long time, but we currently plant about 800 million trees in Canada, which is a fair number a year. I am suggesting that I do not think we can make a tremendous impact on the whole global warming issue by planting more trees. Many of the things I advocate, and we advocate, doing are things like more intensive forest management, which will make the forests healthier, more resilient and more able to tolerate the stress that will come from warmer temperatures and maybe less rainfall.

Mr D. R. Cooke: You are also suggesting that there will be more natural growth, are you not?

Dr Hall: There could be. We know that if you grow tree seedlings in a greenhouse and increase the proportion of carbon dioxide in there, they will grow faster. In fact, I think commercial tomato growers use that as a sort of routine procedure, but we do not know if that is going to happen with larger trees,

because 40-year-old trees and three-week-old trees do not necessarily behave the same.

Mr D. R. Cooke: Do you have any information as to how the rest of the world would look? Is this a Canadian phenomenon that you are expecting or do you expect it to be everywhere?

Dr Hall: I think people expect the same sort of thing in Scandinavia and the Soviet Union, which also have a lot of the same type of environments that we do. They expect an increase in the conditions which allow for these temperate hardwood forests to develop and increased stress on the spruce and pine forests which effectively form a belt around the globe.

Mr D. R. Cooke: What about the tropics?

Dr Hall: I do not know a lot about the tropics, except for some of the things I have read. Most predictions seem to be that the tropics are less likely to be affected than the boreal areas because the temperature increases in the tropics are expected to be close to zero or very small, much smaller than the predicted increases for Canada.

Mr Callahan: Since your expertise is forests, is there any experimentation going on now in anticipation of this type of problem to come up with a new type of tree through genetic engineering that will resist or have a greater flexibility in terms of differences of temperature and also is one that maximizes the opportunity for photosynthesis to take place? It sounds like we have a market for it if we came up with one.

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Dr Hall: I do not doubt we have a market for it. A lot of our research in the past in the field of genetics has been to determine what factors control the physiology of trees and just to find out how variable these trees are. Conifers have been around for the past 70 to 90 million years, so they have survived many ice ages and conditions quite different from those we have now. So one would expect that there are individual trees out there that will be able to tolerate these new conditions.

This whole concept of global warming has not been something that has been driving this research over the years. We have been looking for trees which grow faster, which have better wood qualities and which are tolerant to insect and diseases. At the same time, within the past year or so our group in Petawawa has identified some black spruce trees which are unusually drought tolerant. As a matter of fact, I reviewed a research proposal only a couple of weeks ago which was designed to try to identify this and other factors in these trees. If this is an inherited characteristic, it is something that we can multiply and use in reforestation.

Mr Callahan: I would think we may be forced, as humans, to have what I guess Darwin suggested happened anyway, survival of the fittest, if we are to survive.

The other thing I was going to ask you is, what is the best type of tree from the standpoint of photosynthesis? Is it a leafy type of tree or is it a conifer? What tree is the best?

Dr Hall: There is no species which gives the best; there is probably a range of variation within each species. Some trees will be marginally more efficient at assimilating carbon dioxide and synthesizing cellulose. Trees like that are fast-growing compared to slow-growing trees.

Mr Callahan: The reason I ask that is, we were shown by some other people who were here temperature fluctuations in

CO₂ concentrations 150,000 years ago, and as best as they can determine, I believe, it was low. I may be mistaken on this, but apparently the theory was that because they had large amounts of vegetation, photosynthesis was taking place very well and the CO₂ concentration was not that high. That is why I wondered if a tree that had a significant amount of leaf would be better than one without.

Finally, if I could, because there are others who want to ask questions, in the bog areas, we understand that there is CO₂ emitted. A tree takes in carbon dioxide. Do they take it in only by photosynthesis or do they also take it in through the roots if they are planted in a high-carbon area?

Dr Hall: Let me see. Carbon dioxide dissolves quite readily in water, so presumably there is some absorbed by the roots. But what happens in the tree is that carbon dioxide is converted into carbon in the tree in the wood.

Mr Callahan: I am just trying to think of a way to take the excess carbon from these so-called additional areas that provide carbon dioxide and siphon some of it off through the roots or through some form of—what do they call it when they grow it in—

Dr Hall: Hydroponic growing.

Mr Callahan: Hydroponic.

Dr Hall: Most scientists in the field seem to think that we would be doing well to preserve these peat land areas as they are because they are in balance and there is a sink. They have locked up vast amounts of carbon in there. In many of these deeper peat land areas, they are sitting on large reservoirs of methane, which is about 20 times more active as a greenhouse gas.

Mr Callahan: So you if you release that—

Dr Hall: If you release that, yes, it could be very serious.

Mr Callahan: Interesting. Like Billy Ballinger says, what goes around comes around. Thank you.

Mr Pollock: Along the same lines, I understood that you mentioned broad-leaf weeds actually would grow faster in large quantities of carbon dioxide. That would be then true with trees, would it not?

Dr Hall: Not to the same extent. The increase in growth rates that you get by having higher concentrations of carbon dioxide depends on the way the tree synthesizes its assimilates. Trees, and most food crops, have one type of carbon pathway, as they call it. The broad-leaf weeds—raspberry bushes, fireweed, some of these things that are competitors in the forest, tomatoes and corn—have a different carbon pathway. It is the broad-leaf weeds that have carbon dioxide as more or less a limiting factor. So if you increase carbon dioxide, these plants are well equipped to assimilate it, and they can really increase their growth rate. For trees, that pathway is completely different and the growth rate may be increased, but only by a small amount.

Mr Pollock: I believe we had another presenter in here who basically indicated that the fir tree and the pine were better to take carbon out of the air than just regular hard maple, that sort of thing.

Dr Hall: I am not really aware that any one species is particularly better at taking carbon out of the air than another.

The efficiency rate, I think, for photosynthesis in most trees is down around three or four per cent.

Mr Pollock: Is this a situation where an evergreen would be taking it out more or less year round, whereas the maples would only be taking it out for six months, roughly?

Dr Hall: No. Evergreens shut down their systems the same time as maples. In boreal forests in Ontario, they start up shop about 1 June and they are all pretty well shut down by the end of August.

Mr Pollock: I agreed with your comments as far as wood products being best for packaging and that short of thing is concerned. However, it is a known fact that we are actually going the other way. The transports now are doing away with pallets. They are using a type of rolled stretch plastic to hold containers together rather than pallets. In other words, we are going the wrong way on that particular end of it.

Dr Hall: In a lot of construction nowadays you use steel studs instead of two-by-fours and two-by-sixes. That is something that worries me too.

Mr Pollock: Yes, and it is all along that line.

Dr Hall: Yes. These are broad policy decisions. I suppose someone has to decide that we will not do it that way any more.

Mr Charlton: There are two areas that I would like to talk to you about. First, I would like to go back to what Mr Cooke raised with you at the outset about what you presented being a more positive perspective, because I did not personally take it that way. I think what you did was set out a number of possible positive scenarios and some possible negative scenarios as well. You talk, for example, about reduced moisture content perhaps aggravating caterpillar and insect problems in the forest.

I think my sense was that your last slide pretty well said it all, that the big wheel, centuries of change, is what adaptation is used to and that we do not know, species by species, forest by forest, how well any species of tree is going to adapt to very rapid climate change over a very short 15- or 20-year period. Is that a fair assessment?

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Dr Hall: We do not know, but I think we have some pretty reasonable educated guesses. We have reconstructed past climates from pollen samples from bogs, so we know what the climate was like here 6,000 or 8,000 years ago, for instance, and we can tell by the species that we get from these samples whether it was boreal or whether it was warmer or cooler. We have a vague idea of that, but we do not know.

Mr Charlton: The question, though, really is not what might survive in a particular climate; the question is the adaptability of the forest we have to adapt to a significantly increased rate of climate change, which is what I think we are talking about here. I think that is what we do not know very much about.

Dr Hall: We do not know very much because we have not seen that much quick change. There have been little blips, a change of a degree or more, over a couple of hundred years. We went through this little ice age that lasted from about 200 to 800 years ago, and there have been measured changes there. It became cooler and then it became warmer. It took 18,000 years for the climate to warm five or six degrees and what we are looking at now is that five degrees could happen in the next 100 years. Now the forests, by and large, were able to adapt over

that 18,000-year period, and they probably could adapt to a lot shorter time scale, but we do not know how short, no.

Mr Charlton: That was the point I wanted to get on the record.

Dr Hall: An important point too; that is what gives the unease to the whole issue.

Mr Charlton: The second area I wanted to pursue with you is, you talked about forest biomass burning for the generation of energy. That is something I think we are all interested in. You mentioned a recent study that indicated that the burning of forest biomass, the whole process, would produce a net reduction in CO₂. Can you tell us a little more about that?

Dr Hall: The study did look at about a dozen current conventional methods of energy generation, including coal-powered plants, hydro power, nuclear power and generating electricity from woody biomass. They looked at it from the point of view of how much carbon dioxide is given off in the construction of these facilities and in the operation of these facilities. In woody biomass it was found that even though you are burning wood and releasing carbon dioxide, you are growing so much and storing it in roots and in the soil that you are taking in more carbon dioxide than is going out.

Mr Charlton: This was a straight harvest situation, though, where basically all of the wood that you harvested was being burned and none of it was being used for—

Dr Hall: These are plantations grown for woody biomass.

Mr Charlton: Who did that study?

Dr Hall: It was done by the United States Department of Energy. I have a copy here if members would like to have it.

Mr Charlton: If you could provide a copy to the committee, we would appreciate it.

Dr Hall: I brought one with me just in case.

Mrs Grier: I wanted to pursue that question, so that has already been asked. I also did not quite understand your comments about the locking up of carbon. It has been my understanding that if carbon dioxide was there when you burnt or harvested or something, it was released again, but you talked in your preference for wood as opposed to plastic of the advantage of locking up the carbon. Can you make that clearer for me?

Dr Hall: Wood is about 45 per cent to 50 per cent carbon. If you burn it, it combines with oxygen and you get carbon dioxide. If you grow a tree, the CO₂ is taken into the tree and turned into this.

Mrs Grier: Okay, and then you use it.

Dr Hall: And the carbon stays in there.

Mrs Grier: Does that apply also to paper products?

Dr Hall: Yes, paper products, wood products, any of those cellulose-based things.

Mrs Grier: The other thing I needed to be clearer on was the whole question of sinks, which we have heard referred to by a number of people. I know that a forest would be a sink. Can we say at what point a clump of trees is too small to be any kind of a viable sink? Is this a path worth proceeding along as a way of compensating for CO₂?

Dr Hall: Making sure that all our forest land, for instance, is maintained in some type of forest has a positive effect on it. Any individual tree is taking carbon dioxide out of the atmosphere and fixing it. The size of the forest is not what governs it necessarily; it is on a per-area basis.

Mrs Grier: So proposals for urban greening and street tree planting and those kinds of things all make some kind of contribution.

Dr Hall: They would make probably a minimal contribution in terms of a carbon sink. The big effect is in shading houses. This has been shown experimentally, that a certain number of trees lowers the average urban temperature so many degrees.

Mrs Grier: So it is as a substitute for the use of energy that it is more advantageous than as an actual—

Dr Hall: It means you have to use less energy, yes. If you are generating energy from fossil fuels, as a lot of North American energy is, then that has implications as well.

Mrs Grier: How close are we in your service, which I guess is part of what?

Dr Hall: It is the federal Department of Forestry.

Mrs Grier: Where are we at a policy point with respect to this issue? Are some of the things you are advocating now being embarked upon? What is the policy of your service with respect to global warming and what we can do about it?

Dr Hall: We are in the process of developing a strategic plan for research into the whole climate-warming issue, and there are a number of issues that we want to pursue, some of which I naturally covered in the presentation. That is being formulated. We have a working group of scientists within the department who review global warming issues, who make research proposals and who compete for funds from our science and technology programs to do this research.

Mrs Grier: So you are still in the research stage, not at the point of saying, "These are the policies that ought to be followed"?

Dr Hall: We will continually be in a research stage, because we need to know the dynamics of forest ecosystems and we need to know more about the trees we are working with. We also advocate that one of the best mitigation strategies for global warming is to maintain healthy forests. Any healthy forest is better able to tolerate stress.

Mrs Grier: Did you advocate that before the last budget?

Dr Hall: I am a civil servant; I do not say.

Mrs Grier: Okay, unfair question. Thank you very much.

Mr McGuigan: A couple of technical questions: I cannot remember the source but it was someone who made a presentation to the standing committee on resources development, I think, in connection with Hydro. I remember it because I thought it was a bit strange. The presentation was that the plastic carry-out bag that you take your groceries home in is only one millimetre thick. This presenter said it consumed less energy than supplying a paper bag. I wonder, have energy audits been done to determine this?

Dr Hall: That sort of thing I expect would be done by the departments of energy at either the federal or provincial level. I am not aware of any particular audit, but I would presume—

Mr McGuigan: Your evidence was the reverse and I just wondered what you had to back that up.

Dr Hall: I am saying that if you use paper-based or wood-based products instead of these things, you are sequestering carbon. You are not sequestering carbon by producing plastics; you are using fossil fuels and you are using energy generated by fossil fuels to do that.

Mr McGuigan: I can follow that, but the theory of the other presenter was that you used up more fossil fuel in delivering the paper and making the paper.

Dr Hall: Than in delivering the plastic?

Mr McGuigan: Than in delivering the plastic.

Dr Hall: If he has the numbers to back it up, I am not going to argue with him.

Mr McGuigan: I have to ask you if you have numbers to back it up.

Dr Hall: No, I do not.

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Mr McGuigan: On the question of biomass for producing energy, certainly I am not arguing against the proposal. I guess, with a farm background, I can see on level land, say, growing aspen and developing large enough machinery so that you go out and harvest the aspen, just as today you harvest corn. Machinery could be developed to do that.

Dr Hall: Is being.

Mr McGuigan: I can follow your thinking in the matter of sequestering and using carbon dioxide. The leap I cannot make is how we could harvest, say, the wild forest and use it as a fuel. The physical job of harvesting it on uneven, rocky land and the erosion and all those sorts of things—I just wondered if you could comment on those two aspects of it.

Dr Hall: The data I was referring to about using biomass for electricity generation did assume essentially a farm-type crop, growing willows, alders and aspen. There is a fair amount of information around that shows how it can be done, what the land can produce, how to harvest it and how to get it into a central processing area, but there has been less work done on using natural forests for this purpose, although there has been some work done on it. After all, if you harvest a forest for pulpwood or veneer logs, you load that aboard trucks and bring it into a central processing unit to make lumber or chips.

Mr McGuigan: Just the stem of the tree.

Dr Hall: Yes, or you can chip the whole tree in the bush.

Mr McGuigan: That is where I had problems, bringing in a chipper, a transporter and a harvester and working on sloping, rocky, wet land and so on.

Dr Hall: There are obviously physical limitations to it, but when you start harvesting on some of these steep slopes you might run into other problems of erosion and so on too.

Mr McGuigan: Yes, that is right.

Dr Hall: So there are other considerations there.

I know of a particular study in Newfoundland that was done a number of years ago where they were harvesting natural birch forests, chipping it right in the bush, bringing it into the mill and generating their own electricity with it. There are all sorts

of cost-benefit figures for those types of operations. The Finns have done a fair bit of work on this with their regional heating plans.

Mr McGuigan: You have clarified those two points for me. Thank you very much.

Mr Pollock: Just along those same lines, and of course this is getting a little off the subject, would not other plants fall into the same category as those Mr McGuigan was talking about? Other plants, not trees but other plants such as straw and that sort of thing.

Dr Hall: Straw and kenaf and some of these other things, yes.

Mr Pollock: You could grow them and burn them.

Dr Hall: There is a certain level of combustion value for all these types of crops. You are getting a little bit beyond my expertise on that, though.

Mr Pollock: But they do fall into the same category as trees, though.

Mr McGuigan: They do it with waste from sugar cane.

Dr Hall: Yes, they can be used for that; you can burn it.

Mr Pollock: You mentioned that evergreens and maples shut down roughly around the same time. That is on account of the weather. Does that mean that a planted tree that is kept inside works year round? Does it take carbon dioxide from the earth?

Dr Hall: You can make it work longer if you grow it in your house or in a greenhouse, but the northern plants have to have that resting, shutdown period. And they will shut down. It is a genetically controlled thing.

Mr Pollock: It just does not go on regardless.

Dr Hall: No.

Mr Pollock: Does that happen to the trees even farther south? Do they shut down for a period of time too?

Dr Hall: The palms do not, for instance—they grow all year round—but the comparable hardwood or conifer species in the tropics shut down for a period. It is usually a dry period, where ours is a cold period.

The Chair: I had a question too. I was surprised actually at the figure that you quoted relating to the natural sinks involved with forests, of about five per cent. Having heard that figure, the adaptation work you are doing in terms of your future research made a lot more sense to me.

I wondered how you are working on an international level on the adaptation work. Do you have arrangements, say, with tropical countries to move some of our species to those locations in research programs or to bring plane trees from England and so on? Is that done at all?

Dr Hall: That is done quite extensively. Over the past 60 years or so in Canada a fairly extensive amount of work has been done on that. We have tried in Canada, I guess, almost anything but the tropical trees; we have been bringing in seeds and growing them and seeing what will grow where. We have tried most all the European stuff, hardwoods and conifers, American, Russian and Chinese. Just about anything our scientists can get their hands on they will try at one time or other.

The Chair: I also wanted to ask you a question, although you have certainly not been working there, about the impact of the rain forest. We hear frequently alarmed if not hysterical cries about the depletion of the rain forest. Do you see anything we can do in Canada in terms of our own silviculture practices either to mitigate the loss of the rain forest or to assist rain forest countries with development of other policies?

Dr Hall: One thing we have developed in this country is probably a good integration of the knowledge and management systems to both harvest and reforest forest lands. We have a good system for growing trees, for looking after them and planting them. We know generally what to plant and where, and we have experienced people who have run these systems. To a large extent, that is or appears to be lacking in many tropical countries. So we have a management expertise. The land is different, the climate is different and the species are different, but the same things still have to be done. Trees have to be grown and trees have to be moved around and planted, roads have to be built and the land looked after. We of course can help in that respect, yes.

The Chair: My last question may have been answered, but if it has, I do not understand the answer. It relates to what we have heard called "the gulpers," that young trees in fact do take more carbon dioxide out of the air than, say, older trees in a mature forest. Do you concur with that opinion?

Dr Hall: The rate of assimilation is faster in a young, rapidly growing tree than in an older, mature tree, but do not forget, an older mature tree is much bigger than a smaller tree. So you have a little bit going on over a large area versus a lot going on over a small area. There are research studies ongoing which are trying to answer that particular question, because up until recently not many people have been terribly interested in that.

Another interesting research project, which has just been published in February, in Science magazine, looked specifically at the effect of cutting old-growth forests and then replanting them with young gulpers to supposedly have an effect on the global warming issue. They found, from a carbon point of view, that if you cut these stands and replant them, in order to get the amount of carbon fixed back to the level it was when you cut them, you have to wait from 200 to 250 years. So thus far the biology does not back up the claim.

The Chair: Thank you. I was interested in having your reaction to that question.

Dr Hall, we are very pleased that you have been able to join us today. I think this has been an interesting session. Trees have been raised in virtually every other appearance before the committee. It has been very interesting having you come and share with us your information and expertise. Thank you for being here.

Dr Hall: Thank you for the opportunity.

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RALPH TORRIE

The Chair: Our next witness is Ralph Torrie, who is an energy analyst who has been involved in a number of initiatives related to the integration of energy and environmental planning. He was the facilitator of the energy working group at the Toronto Conference on the Changing Atmosphere in 1988 and served at a special workshop on carbon dioxide abatement strategies sponsored by the United Nations University and the International Federation of Institutes for Advanced Studies.

He is currently associated with the House of Commons standing committee on the environment in its review of global warming. He has had numerous publications and is on the editorial board of the *Energy Studies Review* and is currently the founder and senior partner of Torrie, Smith and Associates, a consulting firm specializing in socioeconomic, technical and environmental aspects of resource management. Welcome, Mr Torrie.

Mr Torrie: Thank you very much. I was pleased to respond, although the notice was rather short, to the invitation to come here today and say a few words about some of the analysis I have been doing on this issue. I do not have a brief per se, although I will be illustrating some of my remarks with some overhead slides and I can leave those behind, if it is useful for your record.

I wish to address a number of interrelated issues. I would like to speak to the current discussion which is going on about the extent to whether we really do have a problem with global warming or not, which seems to have revived a discussion which seems to have been resuscitated in recent weeks. I would like to also discuss the nature of the uncertainty that faces you, as policymakers, in dealing with this issue and show you at least one example of why that uncertainty is not going to go away.

I would like to talk a little bit about the implications of global warming to the Canadian economy, in particular, in general terms. Finally, I would like to offer some comments on what I think the strategies are that we need to be pursuing.

I guess it is necessary to go back over—and you probably have already seen this kind of thing several times this week in one form or another—the basic facts of this case every time one approaches it. First of all, this chart simply shows the buildup of carbon dioxide emissions on an annual basis, the emissions of carbon dioxide starting in 1950 and going to 1986. It divides it into regions of the world.

There are a few interesting things you can see if you look closely at this chart; one is that the North American emissions of carbon have been very close to stable since the early 1970s. But there is still very strong growth in the emissions of carbon dioxide from eastern Europe, which has some of the most energy-inefficient technology ever devised and, of course, in the developing countries, which have the highest growth rates in energy consumption.

I am currently somewhat preoccupied with the global equity in international aspects of this problem, because I am involved in an exercise which is trying to look at this problem from the point of view of the developing countries. But from the perspective of this group here today, I think one of the interesting things is the fact that, when we do all this fretting about how impossible it would be to bring carbon dioxide levels down from their current emission levels, we should remind ourselves that they have been only rising very, very slightly in the past 15 years or so and that the 20 per cent reduction figure really only corresponds to achieving the types of carbon dioxide levels which were characteristic of the mid-to late 1960s.

The reason that carbon dioxide emissions have been stable is because energy use, in total, has not been growing dramatically in the industrial countries and it is only partly because of conservation. About one third of the decline in the energy gross domestic product ratio in the industrial nations is due to structural changes away from the energy-intensive industries towards the services sector and towards less energy-intensive products and manufacturing.

I will not say any more about that now, but when we get all tied up in knots over how much carbon dioxide emission reduction efficiency can deliver, it is important to remember that there are also structural changes going on within the economy which are going to have implications to the carbon emissions in the future, per dollar of output.

This chart is the same thing, only it just shows two groups of countries and it gives you a somewhat more dramatic indication of the growing role of the developing countries in carbon dioxide emissions. The industrial nations' emissions, of course, are totally dominated by fossil fuel burning. The developing countries' emissions are as well, although there are some exceptions and even some countries where emissions from deforestation exceed emissions from energy use.

Corresponding to this history of increasing carbon dioxide emissions is an absolutely solid—this chart, I am sure you have also seen—notice that there is a break in the Y axis. This shows carbon dioxide concentrations in the glacier ice, which is one of the most reliable ways of knowing the preindustrial concentration levels, and how they have grown since the beginning of the industrial age, basically in the late 18th century, to the current. People talk about climate sensitivity. That is sort of the benchmark number which people refer to in this debate and climate sensitivity is basically a shorthand for how much you think the global temperature would increase if the carbon dioxide level finally reached twice its preindustrial level, or somewhere in the range of 550 parts per million.

The climate sensitivity number is the one you hear people debating. Will a doubling of carbon dioxide mean the average global temperature will go up 1 degree, or 2 degrees, or 4.5 degrees, or 6 degrees Celsius? There is a live scientific debate on that issue. The overwhelming consensus is that the range of temperature increase that would correspond to a doubling of carbon dioxide levels is in the range of 2.5 to 5 degrees Celsius.

It is difficult to be more precise because of the numerous assumptions one needs to make along the way in order to come up with such a number. But it is also important to realize that the consensus that it is in that range is quite strong. Yes, there are scientists who are saying it would be less and, yes, there are scientists who are saying it would be considerably more. If you want to pay attention to the outlying scientific opinion, I think you need to look at both ends of that debate because there is a significant number of researchers in this field who point to the fact that the models that are showing at 2.5 to 5 degrees, or in a 2.5 to 4.5 degree temperature sensitivity, are not taking into account the numerous positive feedbacks that will start to come into play as we achieve those temperatures. I am referring here to the fact that methane generation, the earth's albedo and a number of other effects that actually contribute to global warming start to come into play when global warming itself gets rolling.

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The effect of cloud cover can go either way, but unfortunately most of the feedback effects tend to be positive feedback effects. As I say, there are some scientists who have fairly cogent arguments that if you incorporate these feedback effects, then the high end of the range gets up into 6 or 7 degrees Celsius corresponding to a doubling of carbon dioxide levels.

The way I like to think of this, I find it a useful shorthand and I take this idea from a colleague of mine at Berkeley, Florentin Kraus. Think of it in terms of what he calls climatic throwback. What he means by that is to what extent would a particular average global temperature increase? What does that

mean in terms of how far back in time you would have to go before you would encounter an earth climate that would correspond to that temperature.

The vertical axis is millions of years and the horizontal axis is degrees Celsius. You can see that there is consensus opinion that a doubling of carbon dioxide in the atmosphere—to which, by the way, we are almost inevitably committed at this point. It would take an enormous resolve in the years ahead to avoid at least approaching a doubling of carbon dioxide. Many projections of future energy use shows us shooting right past that doubling figure. So the doubling of carbon dioxide in the atmosphere is something which we are probably going to achieve, like it or not.

If that results in a 2-degree or 2.5-degree increase in average global temperature, it is already representing—well, you can see that it is really at about the 2 degree mark that it starts to take off in terms of climatic throwback. It is above that 2 degree mark that you start to rise very steeply on this curve, so that by about the 2.5 degree mark you are looking at temperatures which have not been experienced in the past 1.5 million years or so. By the time you get up into the upper range of the climate sensitivity estimates, the 5-degree range and so on, you are talking about 10 million to 15 million-year throwbacks in global temperature, which absolutely exceeds any sort of climate that the human species has ever had to deal with.

I have a hard time when I get a request to say, "Well, could you come and talk to us about the economic impact of climate change?" I sort of balk at that point. I believe in the market up to a point and all of that. I am not a raving Communist or anything, but let's face it, there comes a point when you are dealing with some of these environmental issues when we are not talking about economics any more. We are talking about whether or not the human species' impact on the global ecosystems on which we depend for our survival can be contained to a level that will not result in us destroying the life support systems that we depend on. Now if you want to try to put a dollar figure on human extinction, be my guest, but I am just not going to indulge in it, you know.

Never mind human extinction. Just take something like global warming. I was in the United Nations when the president of the Maldives responded to the Brundtland report. This is an island which is only a metre and a half above sea level, you know, at the high points. That was the same reaction he got when he started talking, sort of a titter went through the crowd. You know, it was kind of funny, but by the time he was finished, the entire General Assembly was absolutely spellbound by the drama and the gravity of what this issue actually means to the future of the Maldivian Islands in the foreseeable future, within the next three or four generations.

And so we are really getting to the point where some of the effects that industrialization and fossil fuel use in particular are having on global ecosystems is starting to really hit home and hit hard. It is no longer just academic. It is absolutely in the 21st century going to be a matter of human survival for many of the low-lying regions of the world which, as it is too often the case, very often happen to be located in the Third World.

In the Canadian context, let me come back to economics, if it is something which is easier to relate to. This might on appearance seem to have nothing to do with the environment or with global warming. This is the balance of international payments in Canada from 1961 to 1988. You can see that the middle line is the net current account balance. The top line is our merchandise trade surplus. The bottom line is our nonmerchandise trade deficit, which has been declining steadily throughout

the 1970s and 1980s. This is, of course, dividend payments to foreign-owned companies, interest payments on debt, payments for services, nonmerchandise trade in general. Much of the reason for this deficit, as I am sure you know, is structural in nature. There is not much we can do about it, given the level of foreign ownership and the heavy level of indebtedness that characterizes the Canadian economy. It is balanced, however, in most years, in good years, by the surplus that we run in merchandise trade, but take a closer look at the surplus in merchandise trade in this country and that is what this figure does.

This is not quite as complicated as it looks. Each cluster of bars represents a group of products that we trade in with this representing the net totals. For each group it shows the net merchandise trade balance for 1973, 1976, 1979, 1982, 1985 and 1988, in three-year intervals from 1973 to 1988. What you can see, of course, is that we run a steadily and smoothly declining deficit in production equipment and machinery; that we run a steadily and smoothly declining deficit in consumer goods, and that is going to continue for the foreseeable future. Probably this will too. Thanks to the auto pact, we have a more or less stable situation in the automobile industry, but this is what saves us.

Take a look at where the surplus in this country, which keeps this economy floating in the international environment, comes from: agriculture, energy, forests and industrial goods, which is primary metals and semifinished materials. The entire Canadian economy in the global context is absolutely tied either to large renewable-based ecosystems, like the agricultural soils, or the forest areas or to types of production whose impact on the environment is of growing concern to the integrity of the very ecosystems which are also supporting the forest production and the agricultural production.

So the next time somebody tells you sustainable development is a great idea, but it is not economically feasible, which seems to be the buzzword around Ottawa, you know, try to remember this graph. If we cannot achieve sustainability in this country in these traditional areas of strength, then there is no economic future for Canada. We are not going to turn these things around in the next 10 years or the next 15 years.

Sure, we have to make computers and we have to get into biotechnology and all of those new things, but this is what Canada has always been about as far as the economy is concerned and this is what Canada will continue to be about provided that the ecosystems on which these products depend and provided the environmental impacts upon which energy production and these industrial products generate can be contained to sustainable levels.

This is where the rubber hits the road in terms of environment and economy in this country. So when we talk about issues such as global warming in the context of sustainable development, you have to bring it back to the fact that the industrial world, and Canada in particular, depends utterly on the environment for its economic wellbeing, as do all humans and all human societies and all human economies.

So that was the first point. I also wanted to show you a little bit about where this carbon dioxide comes from. Once again, I am sure you have already seen a lot of this this week, but this chart shows that for every gigajoule of each of these fuels; these are different grades of coal, this is wood and this is different petroleum products, with diesel along this end. They are all within the same range. They are various oil products with natural gas here on the end. This is the carbon dioxide emissions that one can expect when you burn these fuels.

If you then take a look at the fuels we burn in this country—and these are Canadian figures; I have Ontario ones, but could not take the time on this assignment to generate special pictures—you will be able to see by looking at these where Ontario differs. If you then take a look at the primary energy used in Canada and compare it with the carbon dioxide emissions associated with that energy use—and by the way, there is no imaginary counting in these numbers like there is in the Ministry of Energy's numbers in its carbon dioxide discussion paper; Hydro and nuclear are counted at their actual energy outputs, not at three times their energy output or anything like that—what you actually see here is what you get.

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The light-coloured bars are the share in per cent of primary energy provided by these primary sources of energy, and the black bars are the shares, once again in percentages, of total carbon emissions that are attributed to that particular fuel. You can see that the carbon dioxide emissions in this country, and this will be characteristic of just about any of the industrial countries, are coming from oil, coal, natural gas and wood, with coal and natural gas making approximately equal contributions. Of course, nobody actually uses coal at the point of end use.

To get an idea of where that is coming from, you have to look at something like this. This is a graph which takes a closer look at electricity production in Canada and it does break it down by province. Once again, the light-coloured bars represent this time/energy production in petajoules of electricity, actual electricity production in petajoules, by region: Atlantic, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia/Northwest Territories. The black bar beside each one of those lighter-coloured bars is measured against this axis over here and it is megatonnes of carbon dioxide emissions, not carbon, but carbon dioxide emissions associated with that energy use.

This is a very interesting graph because it shows you that, unlike the fuel burning, which is more or less uniform across the country on a per-capita or per-dollar gross domestic product basis, there are significant differences in the carbon dioxide emissions associated with electricity production, with the major producers of carbon dioxide in the country on an absolute scale being Alberta and Ontario, with the largest producer on a ratio basis in terms of carbon dioxide per kilowatt-hour of electricity being Saskatchewan because of all that lignite that is burned in the power plants there, which has really high carbon emissions associated with it. On that group of emissions associated with coal I showed earlier, lignite would be right at the top.

So you can see, first of all with respect to Ontario, that the electric power system here—in spite of its large nuclear-hydro component or perhaps partly because of that, simply because of the way that nuclear and coal tend to go together in the Ontario system—you have a significant amount, in the neighbourhood of a little over 30 megatonnes of carbon dioxide associated with electricity production in Ontario in 1988. That of course can be expected to rise in the 1990s, in the late 1990s especially.

What this means now is, if you combine the primary information with the electricity information, you can get a picture of the relative dirtiness, if you like, or carbon emissions of different types of energy use in this country. That is what I show on this chart. This is tonnes of carbon dioxide per terajoule, I think, it does not matter anyway. I hope I have that labelled correctly. The more important thing to notice here is the ranking of the different forms of energy. What you can see of course is that if you use electricity that is coming from a coal-fired plant,

it is just about the most carbon dioxide-intensive form of energy use that you can imagine.

The thing about all of these bars is that they have been corrected, not only for losses in electricity production, but also for things like natural gas flaring and refinery losses along the way. So every time you use natural gas as a fuel, which is this bar, it is not as great an improvement over using petroleum fuels as you might think if you only looked at the carbon dioxide that you produce when you use the fuel, because the fact is that the energy production losses in natural gas are much higher than they are in oil. Oil products get to you with something less than 10 per cent losses along the way. That is, the oil company, in order to get the oil products to you, is using about 10 per cent of the stuff itself, whether to pump it or in the refinery or whatever.

But natural gas is quite another story. There are very, very large losses in the field from flaring and from field-gathering applications and so on. So the whole thing about switching to natural gas has been overplayed, in my view, as a carbon dioxide strategy because the real advantage that you get in terms of an overall picture is minimal. At the point of end use it is good, but every time you use natural gas in Ontario, an additional 25 per cent of the carbon dioxide that is being emitted where you use the gas is going to be emitted somewhere in Alberta to produce the gas. So much for a little bit of technical information about where the carbon comes from.

One of the implications of these numbers, I think you can see, is that this is what I call a metaproblem. It is not an environmental problem which is amenable, in the final analysis, to the technical fix. I am sorry, but it is not. It would be nice if it were, but we are really up against it here. We are up against the long-term implications of industrial society, and we might as well admit it. Yes, it would be nice to get 20 per cent, but that is not what the climatologists are saying is necessary.

The climatologists are saying that we are eventually going to have to bring carbon dioxide down, not 20, 30 or 40 per cent, but between 50 and 80 per cent. You are not going to do that with energy-efficient lightbulbs. You are not going to do that with anything less than a transformation of industrial society, which will come one way or the other. You can pay nature now or you can pay her later, but we are on the verge of starting to pay the price for an extended period of a couple of hundred years of intensive fossil fuel industrialization, which is upsetting global ecosystems in a way which is about to start costing us money and which is about to start costing us lives. The only way that we are going to really cope with that is, I think, to begin by being honest with ourselves about what we are facing here.

And so I find it a bit distressing, having been involved in the formulation of the Toronto target and having been involved actually in the discussions over whether there ought to be a target or not, and I can tell you, since I wrote the target, that the intention was not that if we get 20 per cent everything is going to be well and good.

The intention of setting a 20 per cent target in the year 2005 was to ring an alarm bell because we knew that it was dramatic. We had a roomful of world experts on both energy and climate. Everybody around the room knew that 20 per cent would not be easy, and everybody around the room knew that 20 per cent would not be enough. Now we find governments treating it as some sort of ceiling to be shied away from, at a time when I have not seen any evidence that would lead me to believe that 20 per cent is going to be sufficient in the long run, at a time when we had the task force of Energy ministers of the provin-

ces and of the federal government reporting last year that, "Well, yes, you could get 20 per cent and yes, it would be economic, but if you just leave it to the energy economy, it is not going to happen."

Well, stop and think about that for a minute. I do not know how many of you are familiar with this task force report that the Energy ministers came out with a year ago. It is a rather interesting document just in terms of what it says about our energy system, because they had a consultant go off and do a lot of number-crunching and then the Energy ministers formed a task force and they are about to meet again in April, I believe, of this year. The task force took the consultant's report and massaged the numbers and so on and put the thing out as sort of the official report of the Energy ministers' task force.

There is a very interesting table in there that talks about the potential to even bring carbon dioxide emissions down by 20 per cent by the year 2005. It has three columns. It has one column which describes the technical potential, and it is a great, big, huge number. Then there is another column that describes the economic potential. This is what you could get that would be socially beneficial, and it is also a very large number. It is somewhat smaller than the technical potential. Then there is a third column, which I think is called market measures or something like that, which is what they think will happen if you leave it to the energy marketplace, and it is a tiny little number. Their response was: "Well, yes, you could probably get most of the 20 per cent with measures that are economic, and you could certainly get the 20 per cent with measures that would have a net social benefit in dollar terms, but it is not going to happen, because that is not what the energy economy of this country delivers. It is not about providing least-cost energy."

So set aside the global warming issue just for a minute and think about that. You have the Ministry of Energy saying, "Yes, we could bring our carbon dioxide emissions down and we could do it in a way that would be of net economic benefit to the country, but forget it; it's just not going to happen because, you know, the energy system is not about providing least-cost energy."

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Having worked in energy analysis for a number of years and having continuously tried to drive the point home that our energy policies are not even providing economic energy in the social sense of the word, to finally see that sort of off-the-cuff admission in the Minister of Energy's report—"That is right; yes, you could get 20 per cent and there would be a net benefit, but it is not going to happen," and never mind the fact that 20 per cent will not be enough.

So this backing away from the Toronto target reminds me a bit of the way that you sometimes see people reacting to the news that they have a terminal illness. There is a denial phase that comes in. This is sort of a subjective comment, but the impression that I have been getting in the past few months is that people are really backing away from wanting to admit just how much soup we are really in here. I think it is unfortunate, because how often is it that an environmental issue comes along where you can at least go the first mile with things that are of a net economic benefit?

It is not like the CFCs where you have to find a totally new substitute. It is not like a lot of environmental issues where there are really significant costs on day one. Here is an issue where at least we can get going and benefit society in the economic sense and we still cannot even get a commitment to do that. We get this kind of warm porridge about maybe keep-

ing carbon dioxide emissions about where they are today, as if we had not just done that for 15 years. What sort of accomplishment is that?

Obviously, you are probably getting a more editorialized type of presentation here this morning than you get from your average technical expert. Sorry about that, but I tend to be a bit of an advocate on this issue, and I think it is important to realize that quite a bit is riding on this. You can get into discussing it in sort of very dry academic terms and lose sight of the fact that we are letting slip away from us a major opportunity to start dealing with an important environmental issue which just need not happen. Here is an opportunity for real leadership and it seems to me it is slipping away on us.

I think what we need to do for starters is the kind of thing that I have been doing with respect to electricity in Ontario. I am not sure whether I presented some of this work to the predecessor of this committee at one point or not, but we have been taking a look at this business of investments in energy efficiency and trying to look at how far you could go, just with respect to electricity, in the province of Ontario, if you gave investments on the demand side the same kind of breaks that you give investments in power plants: the same interest rates, the same amortization rules and all the rest of it.

What you develop in this kind of work is what is called a conservation supply curve. It is a cost curve of how much conservation you can get at what price and each one of these blocks corresponds to a different measure. It does not really matter right now what they are. We can get into it if you are interested. There are energy-efficient refrigerators and there is retrofitting of homes, insulation and all of that.

The width of each one of these blocks represents the total amount of electricity you could save in the year 2000, compared to Ontario Hydro's forecast, and the height of each block represents in cents per kilowatt-hour the levelized cost of achieving that saving which, of course, you see. Ontario Hydro basically has admitted very similar numbers in its demand-supply plan. Of course, they do not think you can get it because they are not willing to pay for it, but if you go out you see that you can get up to about 20 per cent of the entire forecast demand for electricity without invoking any measures that are above four cents a kilowatt-hour, and many of which are far below that.

What we need to be doing for carbon, in my view, is actually coming up with supply curves for carbon dioxide emission reductions. That should be the backbone of our policy. Electricity conservation measures would be one of the things that would appear on such a curve; so would fuel efficiency improvements in motor vehicles; so would a variety of other industrial, commercial and residential fuel-saving measures, because do not forget that you cannot ever solve this problem by looking at just electricity. It is only a relatively small piece of the pie.

In Ontario it is about 18 per cent of our end use and even on a primary basis you simply cannot really get at the carbon dioxide problem effectively by just looking at electricity. But I think there is a model here for how we might go about really seriously tackling the carbon dioxide problem. But that presupposes, I think, a much greater sense of concern and deeper commitment than one is detecting in recent days towards really dealing with this problem.

It is hard to be optimistic, and this is the last point I wanted to raise based on this uncertainty problem. It is possible now and it will be possible for a long time to come for the George Bushes of the world and so on to be able to say that there is not

conclusive evidence that we are into a global warming scenario. I will explain very briefly the reason for that.

This climate-sensitivity figure, which I defined earlier—the amount of temperature increase that would correspond to a doubling of carbon dioxide levels—is what is called the equilibrium temperature response. All that means is the temperature increase that would eventually come about as a result of the doubling of carbon dioxide. But eventually is a long way down the road. It is decades away because the oceans have all of this thermal inertia. It takes a long time for the average temperature of the world to change after the signal is received, after the carbon is emitted.

The other temperature that people talk about, the one that we can measure today, is the so-called transient temperature response. The transient temperature response is how much global warming has actually occurred so far. If you measure it today, this is the half degree that people think they are picking up. The fundamental problem is that, because of the way the climate works and because of the time constants in these equations and so on, over the whole range of climate sensitivities that you might want to consider, from two degrees up to five degrees, which are all referring to equilibrium temperatures, the transient temperatures are very, very narrowly defined in a small cluster.

What that means in English is that you are not going to be able to tell whether you are on a five-degree track or a two-degree track or a one-degree track by measuring the global temperature. You will be able to tell if you are on a six-degree or a seven-degree track, but that is the news we do not want to get, because by then you are pretty well way off the scale in terms of being able to cope with it. Actually, I think you go off that scale around the two-and-a-half- or three-degree range, personally.

So you have a situation as politicians where it is unlikely that in your lifetimes anyone is ever going to be able to tell you that it is all right. The worst scenario might happen. Someone might say that we have transient temperatures, which means we are on a six-degree path or a seven-degree path, but more likely the transient temperatures that will actually be recorded in the next 10 or 20 years will simply not tell us if we are on a two-degree track or a three- or a four-degree track. And there is a big difference. At two degrees we are still in the range where at considerable expense it might be possible for human societies to actually adapt. At four and five degrees, I just do not think it is on.

So that is sort of a smorgasbord of thoughts on a number of subjects. I would be happy to try to answer any questions or provide you with answers later if I cannot do it on the spot.

The Chair: Thank you, Mr Torrie. We do have some questions.

Mr Callahan: I noticed on your chart—and correct me if I am wrong—that the cleanest is pure hydro, energy created by just water, as opposed to burning fossil fuel.

Mr Torrie: Yes.

Mr Callahan: And nuclear, I guess, is on a par with it. Then you get into fossil burning and then natural gas. I think I noticed that the natural gas has about half the emissions that coal has. Is that about right?

Mr Torrie: Yes, a little more than half.

Mr Callahan: I asked Ontario Hydro this morning why it does not use gas rather than coal, and it seemed to put it on cost, I think. Do you have any understanding of that?

Mr Torrie: I am not surprised that they put it on cost; that is the way they do everything. But more to the point, even on the question of cost—I should just back up a bit. When you look at that chart, the first thing that needs to be said by way of qualifying it is that I am just talking about the carbon dioxide emissions that are associated with the actual end use of the fuel. There was some very interesting evidence presented to the National Energy Board, for example, just last week indicating significant carbon dioxide impacts of James Bay, phase 2 as a result of the deforestation that will be required in order to plug those watersheds.

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Mr Callahan: Yes, I saw that last night on the news.

Mr Torrie: It is not anything like fossil fuel use, but it is not small either, so even hydroelectricity comes with a carbon dioxide price tag, and even nuclear. If you do a thorough analysis of things like the cement content of the plant, cement is a very carbon-dioxide-intensive material, both because of the fuel use and because of the process actually of making cement itself, in which carbon dioxide is released. There are no really carbon-dioxide-free energy options.

Mr Callahan: But what is the best?

Mr Torrie: Conservation and efficiency is far and away the best. Nothing comes close to it, nothing, at the margin.

Mr Callahan: But over and above that, what is the best? I have a reason for asking this question, because if it is natural gas, there are significant events going on right now with Consumers Gas offering to sell its operation to British Gas PLC.

Mr Torrie: Natural gas is the cleanest fossil fuel. There is no doubt about that. With respect to its carbon dioxide emissions, it is about 50 as opposed to 70 for oil products and 85 or 95 for coal. That is sort of the scale, so it is emitting only about half of the carbon dioxide as coal.

Furthermore, because of the technology of natural gas combustion, it is very often possible to use it in a much more efficient way, joule for joule. So not only does it emit less carbon dioxide per joule of energy, but it can very often be burned more efficiently. The superefficient home gas furnace, for example, is much more efficient than you can achieve with oil. You can get over 90 per cent efficiency in a gas-fired residential furnace. You cannot do that with heating oil. So there is another advantage there.

There is a third advantage, in that natural gas also does not contain as many of the other pollutants that one finds in the other petroleum products, and certainly in coal, the aromatic volatile organic pollutants and so on. It is much less of a problem with natural gas.

The only downside, I would say, is that we are not really sure just how serious the emissions of carbon dioxide are in the production of natural gas. The reason we are not sure is kind of a technical thing.

Statistics Canada used to say that the primary production of natural gas in this country was what the gas companies delivered to the pipeline. They did not even count all of the losses that happened upstream. Only in 1985 have estimates started to be made of the so-called production losses, and they are really large. The energy minister's task force has singled

this out as an area that needs more work. They are so large that the Energy Resources Conservation Board in Alberta and various other experts feel that—they could be as high as 25 per cent. They may be as low as 10 or 12 per cent. It makes a difference. It can close that gap from 50 versus 70 to 63 versus 70, so the relative advantage of gas over oil products is quite a bit smaller if the natural gas losses are as bad as some people say they are.

There is also a problem, just to round out the answer, with methane venting in natural gas production. Methane is a much more potent greenhouse gas than carbon dioxide. How much more potent is still being debated scientifically, maybe 30 times, maybe 10 times, but it is significantly more potent in causing the greenhouse effect. There is a certain amount of venting of methane that goes on in natural gas production, and in coal production, maybe more from coal.

These are all sort of complicating factors, but I have no problem saying, generally speaking, that natural gas is the cleanest fossil fuel. That is why the Americans wanted it so bad.

Mr Callahan: That is what I am concerned about with the Consumers Gas thing too.

Just quickly, one final item. On one of your charts, you showed Alberta as having the highest CO₂ emissions, which amazes me. Why would they be burning coal if they have all of that wealth of natural gas, or do I have the wrong province?

Mr Torrie: Yes, but they cannot use it to make electricity. It is too valuable as an export product. They put their power plants right at the coal mine mouth and it is extremely cheap electricity.

Mr Callahan: So their commitment to selling the gas to either the United States or to someplace else—

Mr Torrie: Or Ontario.

Mr Callahan: —is affecting the CO₂s that are being emitted, at least in that province, as a share of the contribution to the greenhouse effect.

Mr Torrie: I beg your pardon?

Mr Callahan: Their decision to sell their natural gas as opposed to use it and go coal is in fact contributing a fairly large amount of CO₂ to Canada's contribution, I guess. That is what I got from your chart, anyway.

Mr Torrie: Well, yes. I am sure CO₂ does not come into their decision-making very much. It is starting to.

Alberta also makes a case at the national level that the reason its carbon dioxide emissions are so high is that it is shouldering all of the energy production losses and all of the carbon dioxide associated with energy production for the whole country, virtually. Most of those natural gas production losses I was referring to, for example, are in Alberta; 83 per cent of them.

Alberta has a valid case that you just cannot take a national 20 per cent target and distribute it among the provinces equally. Everybody has to take a certain amount of responsibility for the CO₂ emissions in Alberta that are associated with its role in the Canadian economy of being the provider of fossil fuels.

The question you are raising is somewhat different. Yes, there is no doubt they could reduce their carbon dioxide emissions by using gas to make electricity instead of coal; that is true. So could we.

Mr McGuigan: I think one of your charts showed that it would be more efficient and it would result in less carbon

dioxide if a home owner burned the coal right in his own home, rather than burning it at the power plant. Is that correct?

Mr Torrie: No. Did I say that?

Mr McGuigan: I took that from one of those charts.

Mr Torrie: No, I did not mean to say that.

Mr McGuigan: I interpreted it that way and I just wanted to see whether that—

Mr Kerrio: I think he was actually mentioning the highly efficient gas-burning units in homes.

Mr McGuigan: I was talking about coal.

Mr Torrie: Earlier on during my initial remarks?

Mr McGuigan: One of those charts.

Mr Torrie: No. Actually, the point was that nobody uses coal any more in their homes. The only place it really gets used is in steelmaking, cement-making and, of course, power plants, which is the biggest application.

Mr McGuigan: Is it more efficient to burn it in the power plant and transmit it in the form of electricity, as opposed to burning it in, say, a coal furnace?

Mr Torrie: That is an interesting question. It is pretty hard to be as inefficient as electricity production, because they are up against real thermodynamic limitations. The efficiency of electricity production in Ontario, coal electricity is around 35 per cent or so, I think, and then you lose another 10 per cent of what is left getting it from the plant to the end user, so in order to provide one unit of electricity from coal in the home, you are probably burning three and a half units of energy in the form of coal at the power plant.

But there are a lot of other issues that come into the decision of whether society is better off having a few people burning coal with high technology or having hundreds of thousands of home coal furnaces out there. It might be more efficient from an energy point of view, but it is such a dirty fuel that there are great environmental economies, if you like, in centralizing its use.

One of the advantages of having it in a small number of locations is that the possibility of scrubbing the flue gas for sulphur is there. You could never talk about putting scrubbers on home furnaces, it would be out of the question, but on the scale of a power plant, it is feasible; it is going to happen.

Mr Pollock: Is there any way that you can filter CO₂ out of the air?

Mr Torrie: Yes, you can do it. It is horrendously expensive. I am not an expert on it, but my understanding is that most of the technologies that one would consider for doing it involve cryogenics, really low-temperature technologies which are very energy-intensive in their own right, extremely expensive and absolutely not practical as a solution to the problem of carbon dioxide.

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The fact is, carbon dioxide is not like any other pollutant. Where do you think the gasoline in your car goes when you burn it? It goes out the tailpipe—all of it. If you put a tonne of gasoline in your car, your car emits its own weight in carbon dioxide every year, and more.

The hydrocarbon fuels are carbon and hydrogen. Natural gas is pure carbon and hydrogen. The oils and the coals are

somewhat dirtier, but basically, combustion is the combination of oxygen with the carbon in the fuel to make carbon dioxide and water vapour. If you burn a tonne of natural gas, you produce two tonnes of carbon dioxide, because you are combining the carbon with the oxygen from the air, plus a tonne and a half of water vapour.

That is why these numbers are so big. Somebody said the Canadian energy use emits 475 million tonnes of carbon dioxide every year. That is nearly 20 tonnes for every man, woman and child in the country. That is a big number and it kind of boggles your mind, because you are not used to thinking of tonnes of carbon dioxide. You think of it as some sort of colourless, weightless gas, but the fact is, that is where the fuel goes.

Mr Pollock: How does that compare then with, say, energy produced by the old steam engine compared to the combustible motor?

Mr Kerrio: The steam engine is a combustion engine.

Mr Pollock: No, you heat the water and the steam forces the piston back and forth.

Mr Torrie: An external combustion engine.

Mr Pollock: It is not a combustible motor, no. You use the heat to heat the water.

Mr Torrie: It is called an external combustion engine.

Mr Pollock: Okay, call it whatever you like. How does that compare?

Mr Kerrio: You burn coal to boil water to make steam to turn the machine. I really do not know how energy-efficient the old steam locomotives were. I do know that some of the most advanced concepts for automobile engines of the future are returning to high-technology external combustion concepts, the so-called Stirling and Rankine cycle engines where you have a working fluid. It will not be water, it will be some sort of organic fluid that you heat with any number of fuels. One of the advantages of these engines is that you can switch. Any fuel that can heat the working fluid can be used, so it could be gasoline, it could be anything.

The efficiency in these motors can be quite high, but they are drawing-board concepts at this point, basically. The next several generations of fuel efficiency improvement in the automobile and internal combustion sectors will continue to be incremental improvements to the energy efficiency of the motors, the aerodynamic design, the weight and all the rest of it in the car itself.

Mrs Grier: We have not in fact heard a great deal about the Minister of Energy's task force. We had somebody from the Department of External Affairs who told us about the various conferences they had been to over the last two years, and I think we have someone tomorrow talking a bit about one of his reports to it, so what you said was the first real indication we have had as to the conclusions of that conference. Could you expand a bit on the comments you made about the three different scenarios, particularly the scenario that provides that there are social benefits to be gained as opposed to the economic benefits?

Mr Torrie: If you will just bear with me a minute, I will give you the actual net economic benefit figures that came out of that report.

Mrs Grier: And your definition of how they defined the social benefits.

Mr Torrie: Basically, in a nutshell, what the analysis did was it analysed some 150 different measures, not only for energy conservation, fuels and electricity, but also it looked at measures for replacing fossil fuel electricity generation with nonfossil generation, and it calculated the amortized cost of these measures as ways of saving energy, using so-called social discount rates. I think they used seven per cent or eight per cent.

First of all, I should back up a bit. I am sorry, but this requires a bit of explanation and it is important. They were asked to take a look at how much carbon dioxide could be saved by the year 2005. The first thing anybody who is asked to deal with that problem has to confront is how much carbon dioxide is going to be emitted in 2005 if we do not do anything. Well, who knows? Nobody knows, of course, so you have to pick up somebody's projection of future energy use. They used the federal Department of Energy, Mines and Resources projection of future energy use, which I believe is the highest in the country.

Mrs Grier: Higher than Hydro?

Mr Torrie: Oh, yes. These guys think that this whole decoupling of energy and economy is basically history and that we are going to return to the days when energy demand grows as fast as the economy, or nearly as fast as the economy, 0.2 per cent slower. So they have a much more vigorous rate of energy growth than does, for example, the Ontario Ministry of Energy, which has a much more reasonable outlook on this question and which recognizes that there is going to continue to be slower growth in energy demand than there will be in the economy itself. I thought everybody knew that. In my view, the Department of Energy, Mines and Resources is still basically working with a very anachronistic model of the future economy.

For example, the economic future which underlies that energy projection shows all of our traditional energy-intensive industries, like pulp and paper, steel and chemicals, growing faster than the average rate of growth of the economy.

Mrs Grier: We are losing them all.

Mr Torrie: They show the carbon intensity of Canadian energy use getting worse in the 1990s. So it is definitely, I would suggest, a worst-case scenario.

The base line that the consultant had to start with was a vision of the future demand for energy that was heavily loaded towards the theory that Canada is entering into a deindustrialization period, spurred by the free trade deal, in which our primary commodity sectors are going to grow really quickly relative to everything else again. It is sort of going back to the hewers of wood and drawers of water kind of concept of the national economy. In that scenario, the energy intensity is going to be quite high, if it comes about, which it will not.

The reason I am dwelling on this is that everybody is doing this. Very few people are actually stopping and looking. Even though the Brundtland commission report is now three or four years old and has said we have to start looking at a fundamental level at the way the environment and the economy are interconnected, nobody really stops to look at the structure of the economy that they are predicting for the future and what it means to the environment. We end up with these base lines of future energy use that are just horrendous in terms of their environmental implications.

So we had to start with a very high base line in which energy use grows by something like 50 per cent over its 1988

levels and carbon dioxide emissions are right behind it, because they are growing almost as fast, then go through the economy sector by sector and identify opportunities for conservation and apply basically these three different tests.

One was, is it even possible to do it, never mind whether it is economically feasible—still attaching a cost to it but putting it in the estimate, as long as it was technically feasible. That was the so-called technical potential. The next measure down was measures that are economically attractive. Then finally the consultant was asked to sort of make an estimate of what he thought would happen in the absence of any policy incentives towards conservation. This was the so-called market measures scenario. I just cannot quite get my hands on the summary table.

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The Chair: Members of the committee, that report will be available and will be distributed to all members of the committee so that you will have time to review it. Dr Yang, who is our next witness, in fact was the co-chair.

Mr Torrie: This report is dated August 1989. It is called the Report on Reducing Greenhouse Gas Emissions of the Federal-Provincial-Territorial Task Force on Energy and the Environment.

Mrs Grier: There were three tables that you referred to in your own submission that I was interested in.

Mr Torrie: I should have been prepared to speak to those.

Mrs Grier: If that is what it is in, then I can find it some other way.

Mr Torrie: It is in here. If Dr Yang is here, maybe I will put him on the spot, but I suspect he has those numbers.

Mrs Grier: I will ask him when he comes.

Mr Torrie: I think I have one answer. Now that I know someone is coming behind me who can clean up the mess I might be about to create, I will take a shot at it. But it seems to me that they were looking at, in terms of measures that were economically attractive to society, a total net benefit to society of some \$108 billion in return for an incremental capital cost of \$51 billion. This would result in a carbon dioxide reduction very close to the 20 per cent figure of projected emissions which they were trying to get at the Toronto target. I am sorry, I am not able to speak with great confidence on the exact numbers right at the moment.

Mrs Grier: I just thought that you had made a comparison to what was economically attractive with what had social benefits, and there was the definition.

Mr Torrie: The net social benefit, even if you added up all the technical measures, was still positive.

Mrs Grier: What do you mean by that?

Mr Torrie: What I mean is that the total cost of making these energy efficiency improvements is less than the cost of the fuels and electricity that they would save using social costing techniques. That is all. It is quite simple. If you only implemented measures which were economically attractive, you could achieve a total economic benefit, and I believe it was in the \$100-billion range. If you went further and did everything which was technically possible, including some individual measures which were not economically attractive to society,

you would still save more than you spend on a total basis because so many of the measures are so cheap.

Mrs Grier: If you did everything that was technically possible, would you come below the 20 per cent?

Mr Torrie: You would come out almost on the 20 per cent target, as I recall. Keep in mind, given the baseline that they were working with, that is a remarkable achievement. The reason for that, just to add another wrinkle to this, is that the energy efficiency improvements which were assumed by this consultant were lower for the industrial sector than for any other sector. Of course, it is the industrial sector which grows in such a vigorous way in the Energy, Mines and Resources baseline scenario. So in any other more reasonable projection of the future energy baseline, the relative size of industrial energy would be smaller and therefore the ability of this selection of measures to achieve a 20 per cent figure would be, I think, greater.

Mrs Grier: From your charts it appeared as though nuclear energy was the most attractive from the point of view of saving CO₂, but you did make reference to the fact that nuclear and coal were coupled. Hydro has explained to us that the coal is used as the flexible peak loading when it has preponderant reliance on nuclear. Can you expand on that? It appears from what you are saying that if we go nuke, everything is nuke, and then we will save on CO₂.

Mr Torrie: Sure. You could say the same thing about solar. If you went totally solar you would not have CO₂ either. The problem is that you cannot afford to do that. You cannot even start to think about converting the world to nuclear electricity. The ability of nuclear electricity to impact on this problem is greatly overestimated and there have been a number of very excellent analyses. In fact, in most societies—and I am not sure about the case of Ontario; actually, I think it is also true here—the extent to which nuclear draws investment away from the more attractive marginal investments, which are always efficiency and conservation and will be, no matter how hard we work at them, for another 10 years, to the extent that it does that, it is actually taking away from the best solution to the problem.

Mr D. R. Cooke: You have given us a very hard-hitting presentation. I sensed in what you were saying that this was not the first group of politicians you have dealt with and that you were maybe a little frustrated at not being heard. I may be gaining a little bit of that from the Chair's indication that you had some association with the federal committee on global warming.

Mr Torrie: No, no, I am not feeling frustrated at all. I feel passionately about some of these issues and that may have come through in my tone. I am working as a consultant to the federal committee and in that sense I have no complaints at all. They not only heard me as an expert witness, but asked me to help them draft parts of their report. So I did not intend to leave the impression that I am personally frustrated, but I do have young children and I care quite a bit about whether or not we are even leaving a set of conditions that will make it possible for that generation to deal with some of these problems.

I get a little bit worried when we do not seem to be able to muster the resolve to do those things which have a net economic benefit, never mind those things which eventually will be necessary to bring some of these problems under control. So if my voice starts to go up a little bit, that is the reason.

I think we have to start getting serious about some of these environmental issues and I am not sensing that it is happening yet.

Mr D. R. Cooke: It is an incredible issue for us all to grapple with, but we are obviously going to have to do it. The world is divided into all kinds of political jurisdictions and we all need to deal with it. Is there some message you can give us as to how we can communicate with other jurisdictions, perhaps our own federal government, other provinces, other countries?

I am not talking from a political perspective, but from a co-operative perspective. Having worked with the federal committee, maybe you can tell us where they are at in thinking about this.

Mr Torrie: No, I cannot do that. I am not sure where they are at as a committee. I am strictly technical backup for them.

Mr D. R. Cooke: Maybe that was not a fair question, then.

Mr Torrie: Even if I did know—

The Chair: The report will not be out until the spring.

Mr Torrie: One thing I can tell you is that the role of CFCs in the global warming picture is much more serious than we thought when we first started looking at it. I do not think that there is anything secret about this. The federal environment committee is going to issue a priority report on that aspect of the problem, because it is very evident now that the Montreal protocol is not good enough for what we have to achieve in that area. These chemicals, unfortunately, are incredibly effective at contributing to the global warming problem relative to how much of them are up there. We have to stop using them as soon as possible. That is one thing which is coming out loud and clear everywhere right now, that for a number of reasons the CFC issue has to be reopened and we have to get past even the Montreal protocol levels, never mind increasing the level of ratification.

Mr Charlton: I will be short. I just have one question. I am glad you left the conservation supply curve up. People have been working, promoting energy conservation issues for about 15 years in this province and probably a lot longer in other jurisdictions. For a long time it was sort of like banging your head against the wall. It was done in emotional terms from a practical perspective, but without an understanding of questions of supply and cost and so on.

You suggested earlier in your presentation that we should be taking essentially the same kind of approach that you have taken in this conservation supply curve to look at the question of CO₂ reductions. How long would it take to do a major study, to put together the kind of supply curve that could identify packages of potential for CO₂ emission reductions and at what cost? When could we be in a position to sit down and look at a document that laid it out in dollars and cents and emissions terms?

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Mr Torrie: I referred to a report earlier today—the principal author was a man named Florentin Krause—called Energy Policy in the Greenhouse, which came out earlier in the fall of 1989, I believe it was, and a second volume of that report is being prepared by Dr Krause and his colleagues in Berkeley, which promises to be a compendium of technological and other measures for reducing carbon dioxide emissions complete with cost estimates. It will be, apparently, finished within the next

two months. It is a horrendous undertaking and it is a job which can never be finished.

To do an analysis specifically in the context of, say, Ontario or Canada? I do not think I would hazard an estimate just on the spot like that, but I suppose if you could get the right team of people together, you would be looking at maybe keeping four or five people pretty busy for about six months.

Mr Charlton: But realistically, if we proceeded in that direction, by the end of this year or early next year we could have in front of us a good inventory of defined potentials for reducing emissions and the costs of those potentials.

Mr Torrie: Yes, sure. You could do it. The commitment is there. We can do these things. We know how to think about them, you know. It is not like we have to figure out how to think about it. This is a fairly simple issue. Everybody knows where the carbon dioxide comes from, and there is a remarkably strong consensus on what one would do if one were inclined to do anything about addressing the problem.

The Chair: Mr Torrie, we would like to thank you very much for joining us at the committee today. We expected an advocate and we got one. Thanks for being here.

Mr Torrie: You are quite welcome.

MINISTRY OF ENERGY

The Chair: Our next witnesses are from the Ministry of Energy in Ontario. Dr Bunli Yang is manager of the policy development branch of the Ontario Ministry of Energy. In addition, he also serves as the co-chair of the national task force on energy and the environment and was appointed a member of the Ontario Energy Board. Dr Yang received his degree in physics from Harvard College and the University of Illinois. He has been with the government of Ontario since 1978.

Joining him is Duncan Taylor, who is manager of economics and forecasts at the Ontario Ministry of Energy. He received his PhD in industrial engineering from the University of Toronto in 1976. Since that time he has worked in the fields of health policy and strategy with the Ministry of Health and with the regional health authority in England. In 1980 Mr Taylor joined the Ontario Ministry of Energy, where he was employed as an economist, economic adviser and policy adviser before being appointed to his present position in February 1989.

Dr Yang: I would like to introduce my rather taller colleagues, Duncan Taylor, Larry Moore and Barry Beale. We would be happy to answer any questions you might have on our programs or our policy efforts that are under way already. I will talk a bit about the discussion paper and how we got to here, sort of the kind of thinking that went into getting us to here. I had not been prepared to talk about the national task force work, but I can make some comments towards the end about that.

Duncan Taylor, I think, can go over the background for what Ontario's emissions are today, what they are expected to be in view of our energy demand forecast, some assessment of how you build conservation into those demand forecasts and how much we think might be achieved.

Mr Taylor: Thank you, Bunli. I have a copy of the presentation, which I can circulate to the members of the committee.

The Chair: That would be useful.

Mr Taylor: The presentation I have has four objectives: to explain the current emissions of carbon dioxide from energy-re-

lated sources in Ontario; to outline activities under way which will help to slow the growth in carbon dioxide emissions; then, to present our reference projection of how emissions might grow to the year 2000; and finally, to briefly review the potential for further CO₂ reduction in Ontario, drawing from some other work done for the intergovernmental task force which was referred to.

I acknowledge in this that we are covering only carbon dioxide emissions, although we would recognize that the other greenhouse gases are about equal to carbon dioxide in importance in the greenhouse effect.

We estimate that Ontario emitted 164 megatonnes of carbon dioxide from energy-related sources in 1988, one third of Canada's total and just under one per cent of the world's total. This slide actually is not in the package, but it shows the sectoral contributors. The largest sector was industry with 30 per cent of the total, followed by transportation at 26 per cent, electricity generation at 20 per cent. Just by illustration, this compares with much higher proportions in some other provinces. Electricity generation in Nova Scotia, for example, accounts for over half its carbon dioxide emissions. Residential and commercial buildings account for 18 per cent in total while the energy industry, including refineries and pipelines, is six per cent.

The next slide shows this as the numbers which are just shown graphically, but it also shows the totals by fuel. Oil represents 39 per cent; coal used by Ontario Hydro and the steel industry, 30 per cent; natural gas, 26 per cent; and the use of wood and wood waste, 5 per cent. We have included here the use of wood waste by the pulp and paper industry; use of wood waste and spent pulping liquor.

It is worth noting that many of the carbon dioxide emissions come from widely dispersed sources: from furnaces, water heaters and heating systems in homes and commercial buildings at 18 per cent; from cars, light trucks and other gasoline users at 17 per cent; from small industries and agriculture at seven per cent; and from diesel use in heavy trucks, buses and trains at five per cent, all widely dispersed through the economy.

Large sources of CO₂, on the other hand, include coal-fired power stations at 19 per cent; the iron and steel industry, four fifths of whose emissions come from the use of metallurgical coal for smelting iron ore; and the pulp and paper industry.

The next slide shows some typical sources of CO₂ emissions. In one year, a detached single-family house accounts for seven tonnes of CO₂; if heated by a standard natural gas furnace, 11 tonnes.

Mr Kerrio: Excuse me. Let me question that one. Is that the most up-to-date, modern type of furnace you are talking about there?

Mr Taylor: No, that is an average over existing furnaces.

Mr Kerrio: It is not one of the highly efficient ones.

Mr Taylor: No, it is not. It is not the highly efficient one.

It is just under 11 tonnes of CO₂ if it is an oil-heated single-family house. A typical car could average about five tonnes of CO₂, less if it is a small, fuel-efficient model like a Chevy Cavalier and more if it is a specialty vehicle like a Jeep Cherokee. A heavy transport truck we estimate could emit 246 tonnes a year, and each tonne of steel accounts for 1.7 tonnes of CO₂. In electricity generation, each kilowatt-hour involves between 0.9 and 1.0 kilograms of CO₂ if generated at a coal-fired station.

There are several activities now under way which will help to slow the growth in carbon dioxide emissions in Ontario. They include the regulations under the Energy Efficiency Act; proposed revisions to the Ontario Building Code Act; Ontario Hydro programs to give incentives for more efficient electricity use; and Ontario's gas-guzzler tax, which taxes some 48 or 50 models of extremely fuel-intensive cars. The proposed auto emission controls should help to encourage vehicle fuel efficiency, and government programs, which include our cogeneration support program, and conservation programs such as in municipal buildings will also help.

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But the main thrust of the activities under way for improved energy efficiency does come from consumer and business investments throughout the economy.

This is reflected in our outlook. The ministry's reference case energy demand outlook has been used to project the CO₂ emissions that might result from that. We project to the year 2000 that the economy could grow by just over three per cent a year and energy demand by two per cent a year. The three per cent economic growth represents a slowing of the pace of recent growth but a sustainable long-term average.

The two per cent growth in energy demand implies a significant reduction in energy intensity of over one per cent a year. This, in turn, reflects the activities I listed and improvements in energy efficiencies brought about by users throughout the economy.

One of the factors driving this is the expectation of higher real oil and gas prices. One of the improvements in energy efficiency that are embodied in this forecast is that we project that by the turn of the century, new cars could be 12 per cent more fuel-efficient than today. Similarly, new houses are expected to be 10 per cent better in construction and gas furnace efficiencies could improve by six per cent on average.

In industry, we project that industrial energy intensity, the amount of energy per unit of output, could fall by 0.6 per cent a year, reflecting efficiency improvements and structural changes.

The result of this is that, with economic output projected to grow at 44 per cent and population at 16 per cent, we see our reference case of energy demand growing by 27 per cent.

Taking this energy demand outlook and projecting it for the emissions of carbon dioxide, we see that carbon dioxide emissions are projected to rise by 17 per cent in total, or 28 megatonnes, growing from 164 to 192 megatonnes by the year 2000.

Within this, emissions from direct fossil fuel use—people who burn fossil fuels in their cars, their homes, their industries and buildings—grow by 23 per cent but the indirect use through electricity generation is projected in this case to fall by seven per cent. These two separate projections are examined in the next two slides.

We see emissions from direct fossil fuel emissions growing most significantly in the industrial sector. We see an 18-megatonne increase there and also significant growth in the transportation sector. This reflects very simply the dominant role in today's CO₂ mix. As I pointed out at the beginning, they account for almost 60 per cent of total CO₂ emissions. It also reflects an economic outlook that does have strong industrial growth.

Emissions in the residential and commercial sectors, on the other hand, are projected in this outlook to increase only a little because of several factors: continued off-oil substitution in buildings; a growing electricity share for heating; substantial

efficiency gains projected as a result of market forces, including the increase in prices; technology improvements such as the high-efficiency gas furnace; and government regulations that affect, as I mentioned before, the building code and the Energy Efficiency Act.

Moving from direct fossil fuel emissions, the emissions from electricity generation, which started at 32 megatonnes or 20 per cent of our carbon dioxide, are actually projected to fall in this outlook, despite a steady growth in electricity demand of 2.8 per cent a year.

This can happen if demand is met by a mix of efficiency improvements, parallel generation that is according to the ministry's target, and we have estimated that most of this would come from industrial cogeneration, and the new supply that Ontario Hydro plans from Darlington, new hydraulic stations and the first stage of the purchase from Manitoba.

In summary, we have projected that carbon dioxide emissions in Ontario could grow by 17 per cent, even while the economy grows at 44 per cent. This rests on a lot of specific assumptions and end uses that we believe are achievable through market forces, the policies that are in place and known regulations. It also means that to achieve further reductions beyond what these factors could bring about will be harder to achieve.

To look at the potential for further CO₂ reduction, we examined the study that was done by the DPA Group for the intergovernmental task force on energy and the environment. This is a study which you referred to just now and which, I believe, will be presented tomorrow.

Using this study, the task force report concluded that for Canada, reductions in CO₂ emissions could be achieved that would result in a four per cent increase in CO₂ by the year 2005 if all the measures deemed economically attractive to society were implemented. This is all the measures for conservation of direct fossil fuel use, electricity conservation and substitution of new electricity generation for retiring stations.

Our preliminary analysis in the ministry reaches a similar conclusion for Ontario. If energy users were to adopt a wide range of measures similar to those described in the task force study but adjusted to Ontario conditions, it might be possible to achieve reductions that would result in only a small increase in CO₂ emissions by 2000. The most promising of these areas to achieve further reductions has to be examined in more detail to see what can be achieved and by what mechanisms.

There are many individual measures involved. They include further fuel efficiency for cars, where efficiency improvements of 30 per cent or more have been suggested. In recent years, the efficiency of new cars in Ontario has flattened off. Since 1984, in fact, the average efficiency of vehicles purchased in Ontario has worsened. Some of the suggestions also include greater use of transit, which accounted for a significant part of the fuel savings projected in the task force study.

There is also a wide range of industrial conservation and process changes, particularly in the steel industry where there are several technologies mooted that could reduce CO₂ emissions by the use of natural gas and some of them involving the use of electrotechnologies such as electric arc furnaces. As I said before, the steel industry alone accounts for almost 40 per cent of industrial CO₂ emissions and, therefore, deserves much further study.

Further electricity efficiency would also help to reduce emissions from coal-fired stations, as you have heard. Stronger building code requirements for both residential and commercial buildings have been proposed to improve building design and

construction, and greater adoption of high efficiency heating systems has further potential.

Many of these areas of potential reductions have been reflected in the government's global warming strategy paper among the proposed action steps. That paper is the subject of Dr Yang's presentation, to which I now turn.

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Dr Yang: I thought what I would go over is basically the presentation that we made at the symposium last week, with a bit of an elaboration on and discussion of the goals and targets that you see in the discussion paper. Perhaps at the end, if there is some time, I can make some commentary about the national task force, what it tried to conclude last August, what was reported about its conclusions and what the ministers decided about it. Those are, I think, three different things.

Briefly, you have been listening all week to how certain the greenhouse effect is and that there are some uncertainties related to global warming and how there is a wide spectrum of opinion on the kinds of climate changes that would occur. It is really going from certainty to uncertainty in that direction.

The kinds of uncertainties, I think, are just listed here. I would just like to focus on the middle one. That seems to be really where all the "scientific" uncertainty is. You have heard about the Marshall report, probably, and the scientific backlash supposedly in the last couple of months, but that is not really related to the greenhouse effect or global warming, even. It is sort of how much; when; what are the local impacts going to be; is it going to be drying in the American grain belt; in Saskatchewan, is there going to be higher moisture levels—those kinds of questions. It is very difficult to answer.

I would point out, though, that the rate of technology change is really quite a major unknown here. Most of the discussions about, "Can you achieve so much or at what cost?" generally depend on a sort of business-as-usual projection of what you understand technology to have in front of you.

Finally, we have not really faced the question yet. If we are talking about global warming, should we talking about spending now to try to prevent it? I think you have heard Ralph Torrie today and several other witnesses indicate: "Gosh. Even if we were to reduce emissions nearly to zero in the industrialized world, there is an embedded global warming that is going to be occurring anyway. So why are we talking about prevention mechanisms for expenditures when maybe what we should be talking about now is mitigation, adaptation? Maybe we should be looking at what kinds of crops we will be growing in 20 years or whenever."

I think that is a policy question that has yet to be addressed. It is certainly international in scope, and I want to come back to that international context a bit. In Canada, these are the major events that have been taking place, at least with respect to the energy ministers, following that June 1988 conference in Toronto, which was really a watershed. I use that as an advised metaphor, but it came at the end of a drought in North America after a heat wave of about eight days that was unbelievable, and meanwhile there were these used needles washing up on the New Jersey shore. So the environment was very big in the public consciousness. I would say serendipitously that that is one of the reasons that that Toronto conference has been a reference point for this global warming thing.

In August 1988, the energy ministers established a task force, which reported a year later in August 1989. The August 1989 report was focusing mainly on global warming with some slightly allied energy environment issues. Over this past year

we are broadening that out to other things: nitrous oxide emissions, volatile organic compounds, relative organic compounds. The environment ministers meet on 20 March and the energy ministers meet on 2 April. Time will tell whether their two communiqués resemble each other.

Mrs Grier: Why do they not all meet together?

Dr Yang: It is very difficult getting 13 politicians in the same room and getting 26 to talk about some policy issues that they are all comfortable with. We may see that this year.

Here are some of the potential impacts in Ontario. I do not want to dwell on this too much because these are all speculative and the models do not tell you very much, but there is a lot of work to be done in terms of, if global warming is coming at us at the pace that many people seem to believe, here are some of the things that we are going to have to accommodate; for example, this ice and snow cover. Of course as it warms up, it is going to decline. But that is going to mean that the permafrost goes down—it will be farther from the top—and more methane is going to be released, so that is going to lead to more global warming. These feedback effects of not just what the regional impact is, first, but what is going to happen after to global warming, we are only beginning to study.

The most important of these potential impacts is probably the last one: the pace of change. Some people have talked about, "Gee, you know, a warmer climate, particularly here in Ontario, might be not so bad. We might have a longer growing season. There might be more CO₂ to help the crops." That all may be true if soil dryness and moisture conditions remain reasonably favourable, but it is: How do you get from here to there? There are going to be many economic dislocations along the way. It is very likely that across the world there will be no regional winners, because everybody will be having to adapt to economic dislocations along the way.

I have talked about it as a watershed, but I thought I would put out just a reference to the three major energy-related recommendations in the call to action issued by the Toronto conference in June 1988. They had three major things on their mind. One was the chlorofluorocarbons. I understand that the Montreal protocol agreed that CFCs will be reduced by 50 per cent by 1998. Yet this conference was saying that that is not nearly going to be good enough; it is going to have to be accelerated so that the use of CFCs is wiped out by the year 2000—that is, eliminated.

In Ontario and also in Canada, we have announced already that we are going to be attempting to phase out CFCs by 1998—not all the CFCs, almost all the CFCs. The halons are still out—the ones that are used for fire extinguishers; for example, several thousand tonnes were used at the Hagersville fire.

"Stabilizing the atmosphere at concentrations of carbon dioxide is an imperative goal." These are quotes directly from the Toronto conference final statement. You will see that in the discussion paper we are actually agreeing with that and broadening that to include more than just carbon dioxide but all the greenhouse gases that lead to global warming.

Finally, as Ralph Torrie indicated too, he was heavy in the midst of the last-minute bargaining on the statement. As an initial goal, the Toronto conference came up with this notion that, "In order to achieve this, what would it take and by what time?" Nobody knows by what time, but what they could estimate then as being better verified to date but not pinned down yet is that this would take roughly a 50 per cent to 80 per cent reduction from today's levels.

Just to put that into context, that is not just for Ontario or the industrialized countries; that is everybody. That is saying that our total emissions of carbon dioxide every year right now in the world are just over 20 billion tonnes, so that would have to be cut somewhere between five billion tonnes to 10 billion tonnes. Agreed; it is too difficult to do in any kind of reasonable time period that you could set up as a reasonable goal, so we had better come up with some kind of quantifiable target. The conference chose 20 per cent, which sounds big enough but not unachievable, and it picked the time frame of about 15 to 17 years. That was an arbitrary choice, arbitrary in the sense that it is not too close, because you need some technologies to change—you need car fleets to change over; you need to be able to buy new equipment—but not too far, because you cannot take the heat off our society. Bear that in mind. But the 20 per cent by 2005 and does not do anything for you. It does not get to the stabilization of concentrations. It just simply reduces emissions. It is an arbitrary level of emissions reduction.

What is happening worldwide? Under the auspices of the United Nations, there is a development right now of a framework convention and a possible series of protocols very similar to the Montreal protocol process. The Montreal protocol process took about nine years from its official inception. Under the UN process, people are hoping across the world that with global warming it will be much faster than nine years. But the tentative date for the first framework convention is still 1992. There is a great deal of effort right now mounted by the European Community, and you may have heard of it from the speaker from the Netherlands. I am not sure exactly what he would have said, but I know the Netherlands, Austria, West Germany, Sweden and Norway have banded together as a little bit of a group. They are strongly pushing for much accelerated work on the framework convention.

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The intergovernmental panel on climate change which has been convened by the UN, and I hope the Department of External Affairs officer spoke about that, is having three major reports ready by October 1990 and hoping that they will be a solid basis, eliminating controversy over the science, over the kinds of response strategies open. There will still likely be a very great amount of controversy left over the relative shares between the developing world and the industrialized countries. That is unavoidable. That, as I have pointed out here, is basically the key issue that is going to face any kind of international agreement.

Norway has already declared itself. They have said they are going to try to stabilize emissions at some unknown level. I use those words "stabilize emissions." Stabilize implies stability, equilibrium, constancy. They have not promised that. They have just said they are going to try to stabilize by the year 2000. They came up with this goal in May 1989, so it was almost a year ago. They were the first and it was not toothless, even though they did not come up with a whole panoply of action steps. They agreed that, subject to international agreement, they would set aside one tenth of one per cent of their gross national product every year for assistance to the developing countries, which amounts to about \$500 million. So they were ready to put muscle into their words.

The Netherlands is the most aggressive in the world in terms of both program and goal statement. They have said they are going to reduce the expected level of emissions in carbon dioxide back to 1989 levels by no later than 1995. In five years they are going to be back down to what they are right now.

Recognizing that there is a flywheel effect, there is going to be some more energy consumed for a while. They are going to bend that back down, cross the axis back to today's levels, and I think they are hoping for about a one per cent reduction per year after that so that by the year 2000 they can get about five per cent lower than what they are today. It is an extremely ambitious program that they have, regulatory and spending. I have not seen the latest, but I believe they are going to be spending in the order of \$200 million a year on global warming initiatives alone. This is a country of about 19 million people.

Victoria and New South Wales are provinces in Australia. I should mention Oregon too, in the United States. Those are three that are sort of comparable to Ontario in terms of being a state or a province that has adopted the 20 per cent target reduction of CO₂ emissions by 2005. It is a bit soft. Victoria's actual words are something like "aim for an interim objective for planning purposes," but there are no specific actions listed. They have said, "We are going to push energy efficiency; we are going to look at agricultural impacts, we are going to study climate, we are going to do some more research." Those are important steps to get governments turned around, but I think Ralph Torrie made use of the phrase "where the rubber meets the road." They are not, by themselves, going to lead to reduced emissions.

This bottom here we can return to later. It was just an example, that if we try to keep CO₂ emissions fixed in some future scenario with many more people than we have today, which is what is happening, even if you were to ask the developing countries to keep roughly the same level of emissions per capita, this is roughly a 50 per cent reduction in the industrialized world per capita. I do not think very many people would consider that to be equity, keeping emissions per capita in the developing countries constant.

Just for reference, Duncan indicated that in Ontario already, the average gas-heated home emits that much carbon dioxide. A house with a high-efficiency gas furnace is almost five tonnes. A typical car is five tonnes, the typical Ontario load is about 18.5 tonnes per person.

To give you an example of this business of the targets and goals, and what Ralph Torrie was talking about too, that the 20 per cent target does not really get you anywhere, effectively, if you listen to our economists in our ministry, this is the trend. This is what would happen with expected energy demand. This is at today's level. This is basically what Norway is trying to do. They are saying, "Let's try to stabilize," and "We'll reach this level of stability by the year 2000." Let me emphasize that that is a significant drop.

Now this, in the context of Ontario, is roughly about a two per cent per year increase, and that builds in a 1.1 per cent improvement in energy conservation, energy intensity every year, as Duncan indicated. Ralph did not like the Department of Energy, Mines and Resources forecast. The EMR forecast would have been higher than this, of course. They build in only, I think it is, 0.2 per cent improvement in energy intensity every year, whereas the Ontario forecast builds in 1.1 per cent.

So stabilizing emissions is one thing, and it is hard. This is changing the direction. This is trying to achieve actual reductions. What the Netherlands is saying is it is going to try to get to here by the year 1995. All right, they are here right now. They know there is a bit of a flywheel. They are going to try to get back here, and they are hoping that this will be one per cent per year so that by the year 2000, this will be five per cent below today's levels.

What would it take to stabilize concentrations up in the atmosphere, and why is stabilizing concentrations important anyway? It is the amount that you have up there, not how much you are emitting each year, which is sort of adding to that, but it is how much is up there that is going to determine how much the earth warms. So what you want to do is keep that fixed. You hope to be able to get that fixed at some level not much higher than how much carbon dioxide is up there already, today. But all the countries are still putting out a lot of emissions.

The scientists estimate that if you were down here, 50 to 80 per cent reduction—and the latest coming out of the UN is that a 70 per cent reduction in CO₂ is going to be necessary—a 100 per cent reduction in CFCs, possibly only a 25 per cent reduction in methane, and unknown for nitrous oxide, but at least for CO₂, you have to get this curve extended down to here. And over what time period?

The Toronto conference targets were that if this is the year 2005, this should be 20 per cent, right here. You can see why I said earlier that whether it is 2005 or whether it is 20 per cent or 15 per cent, that is sort of an arbitrary number. What the Toronto conference felt was important was to make sure that people's feet are held to the fire to get this curve coming downward, not going up there; not stabilizing but going down. I hope that is a better explanation than we have managed before on goals and targets.

Now, where are the proposals for Ontario in that discussion paper? You have heard several times already that there is a lot of uncertainty as to the kinds of impacts that might occur. We are saying that the risk of those potential impacts is high enough, the gravity of those is serious enough, that actions should be taken today. I will go back later to what taking actions worth doing in their own right really means.

We have adopted as our goal contributing to the ultimate goal of stabilizing global concentrations up there, as I said before. Why is Ontario not just saying, "Well, stabilize global emissions"? It is clear, because we cannot control what is going on up there for everybody, that even if we shut down to zero, those concentrations might still be rising. So the phraseology in the discussion paper is "provide leadership in trying to achieve" that worldwide.

I think all the environmentalists, the scientists, the climatologists, but also the politicians, would agree—excuse me, I should not say politicians—the senior management of bureaucracies would agree that really is the ultimate goal, because that is the environmental impact that one is trying to get at. What I tried to do in the earlier discussion with those little charts is indicate it is such a difficult goal, you have to get your directional change right. You have to get moving in the right direction. We are certainly moving in the wrong direction if our annual emissions continue to rise.

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Ralph Torrie indicated that over a couple of years you might see that industrial societies actually flattened out for a while, so for maybe two years there was a little blip in the curve. He did not also mention at the same time that there were serious recessions associated with each of those blips in the curve. It is highly unlikely that governments would choose to achieve that blip, that little decline, that momentary stability in the emissions curve through the use of a recession.

But what we are saying here is we are going to try to galvanize society to try to get that directional change accomplished and get that on a permanent basis. So the paper proposes that we adopt a notion of, how do you see that there

are checkpoints, that there are milestones along the way? Can you check your progress, report on that progress and make sure you are continuing on the right path?

What we have come to so far in terms of developing a consensus within government, apart from going outside and trying to extend that consensus outside of government, is that we are not prepared as a government to say, "This problem is so important and the risks are so great that we have to take a large number of very costly"—and I broaden the definition of that term "costly"; not just dollars, but social and environmental costs as well—"measures to this kind of phenomenon."

What we are trying to do is to better understand both the science but also, at the same time, what is society prepared to undertake? That means we need this consultative process, we need to develop this recognition; first, an understanding of the issue and the problem, of course, but a recognition that everybody is a part of this. It is not just the way acid rain was; maybe four or five major polluters, sources of the problem. If we could come to a societal consensus on them, this is a societal consensus on us.

So we are proposing that we consider a range of specific actions on things that are worth doing in their own right, meaning multiple payoffs. Somebody did say to me recently "things worth doing in their own right." That means they must be being done already, right? If they are worth doing in their own right, they must be being done already. So you are recommending, under global warming, effectively not doing anything at all. That is the critique.

I would try to understand what the implication of that kind of critique is and that would be effectively adopting Pangloss's attitude in Voltaire's *Candide*, that all things are for the best in this best of all possible worlds; that if everybody is really doing everything that is worth doing, this must be the most perfect of all possible worlds.

Obviously, the answer to this thing about what is worth doing in its own right—we are saying what is worth doing in its own right is not happening because there are market failings, for example, things like landlord-tenant. Everybody knows landlords are very chintzy with energy-efficiency expenditures. Tenants are not particularly ready to make those expenditures themselves because they are not sure how long they are going to stay in the apartment.

That is an example of where certainly people in the society could be saving money, saving energy, reducing CO₂, but the financial incentives in the transaction are not there. The people who make the investment are separated from the people who get the benefit. That is a market failing that is worth doing in its own right, but it certainly is not going to happen by itself and it is not happening in this best of all possible worlds.

So there are economic energy savings out there to be gained. Certainly things like eliminating the use of CFCs that deplete the upper ozone layer, tree planting—there are numerous benefits to tree planting and reforestation, not just of course the commercial species, but as you may have heard several times, urban trees in the CO₂ problem count for more than just the normal tree because they can provide shade and therefore reduce air-conditioning requirements. They also help with ground water quality; they help with retention of carbon sequestration in the soils. There are many benefits to tree planting, but they will cost money. I am saying here worth doing in its own right; I am not saying these things are not going to cost money over what is being done today.

There are other air quality concerns and certainly minimizing the future costs of adaptation, whatever kind of embedded

global warming we have is one. When we return to this notion of involving the public, it is extremely important in our minds that when you talk about developing a societal consensus, you keep the pressure on everybody; that is, this notion that governments are not going to solve it.

We are not going to just be able to come up with a magical regulation that says: "It is this technology or it is this thing for fuel economy, and you folks can relax now. It has all been solved and government is going to play sort of police on whether you are saving energy properly or not." It has to be an expectation by local communities that they would like to design their communities with public transportation in mind, that they are going to design to permit subdivisions to rise where trees are integrated in with the development, that road allowances are going to be narrower, that we are going to have less dependence on cars. Those kinds of things are not going to be dictatorial and regulated. They are going to have to come from a desire from within that this is the way our society should be moving. So we need to keep that pressure on and to involve the public.

I mentioned this thing about directional change. How do we know that any of these things that we are proposing are actually working? The six milestones that we have identified and that I qualitatively sketched over with those several graphs that I showed are, first, you want to lower the rate of annual emissions growth. It is still growing up each year. Then you want to stabilize that. This is the first time I am using that word "stabilizing." I do not want to use that too often linked with the word "emissions," because that is not the goal. Stabilizing emissions means reducing the level of growth in those emissions, just keeping it constant for at least two years in a row. That would tell you something.

Then you would like to begin to reduce your annual emissions levels, to be on the path to Nirvana, I guess, the right path. What we put in the paper as the first step that you can actually, tangibly mark yourself on and report-card yourself on is reducing your annual emissions so that you are back to today's level.

We have not called that stabilizing emissions at 1989 levels. We have called that achieving reductions of expected emissions so that your total levels are lower than they were in 1989. That is going to take a major turnaround in the way in which we use energy and supply it in our economy. Ralph mentioned, by the way, natural gas. I want to reiterate what he said. Natural gas is clean at the burner tip, but it is not necessarily very clean overall, from cradle to grave, as a fuel.

Alberta has found that in its inventory of emissions, almost 50 per cent of its total CO₂ emissions come from the natural gas industry. That is from a province which generates all of its electricity from coal. A lot of people are talking about using natural gas for generating electricity in Ontario, but they are not doing it in Alberta.

Why does the natural gas industry emit so much CO₂? That is probably the subject for a different discussion, but the gathering fields, the exploration, the processing to pull out the natural gas liquids and all that take up—I think about 30 per cent of Alberta's CO₂ emissions come from the natural gas processing side; only a little bit of them comes from the actual use of natural gas.

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Getting beyond our first step, then we want to be achieving levels 10, 20, 30 per cent, whatever the number should be, below today's levels. Now, it turns out there is a target out there, the 1988 Toronto conference, a target of 20 per cent by 2005. Our analyses within Ontario, as you have seen a hint of

from Duncan's work, make it seem very difficult for us to achieve the 20 per cent target by 2005. That is not to say we cannot, because if we are able to achieve that first step that is in the paper, of reducing back down to 1989 levels by the year 2000, we are still on that road. That, in itself, is a very ambitious target.

Finally, what we really want to achieve, after all, is not any arbitrary target along the way. We want to achieve stability of concentrations in the atmosphere. So we want to achieve a level within Ontario which, by international consensus, is consistent with stabilizing the concentrations in the atmosphere.

The kinds of actions that are in that paper—you have probably seen some of the press commentary. I will leave you to your own conclusions on the press commentary. The kinds of things that we have tried to adopt in there are actions of government, but they are enabling actions, they are door-opening actions. The actions taken by governments, except in terms of government leadership, can save some emissions on our own, but they have to be able to put things in place for other people in their own daily lives and businesses to be able to save energy and also to reduce emissions.

One of the steps was changes to the Power Corporation Act so that Ontario Hydro could be legally empowered to offer incentives to electricity customers. Why do we not see that from the gas utilities? The reason for that is regulatory. For every dollar that the gas utilities can invest in selling gas, they earn a profit on it, they earn a rate of return. The Ontario Energy Board has typically set that at about a 14.5 per cent rate of return on equity. But they do not earn a penny on anything that they invest in conservation.

The energy board has allowed them to write that off as an expenditure, so consumers pay for that in their rates, but they do not earn a profit on it. So one of the items in this discussion paper is making it possible for the gas utilities to earn a rate of return on their conservation expenditures, so there is no disincentive, when they go out there, to invest in conservation. That is an empowering step.

Governments neither could nor would want to dictate how much the gas utilities might choose to invest or how much the consumers would pick up and save as a result of that kind of investment. That is why I say you have to keep the pressure on.

Labelling, monitoring, reporting of net emissions—the light of public scrutiny is one of the most powerful weapons, we think. I think an example of that is the blue box recycling campaign where there is no economic self-interest for the people who participate and yet there is a high level of participation because there is a public expectation of that.

We have also put out there the co-ordination of tree planting and preserving of trees. I want to emphasize it is not just an Arbor Day planting of seedlings, but you need to preserve trees. The typical urban tree has maybe about a 30- or 35-year lifetime. I think in the city of Toronto there are about 100,000 trees. That means about 3,000 or 4,000 are dying every year, so this is no mean task just to keep up the level of trees that we have, much less to do some extra urban forestation.

Where the market incentives are not there for people to take action—for example, car pooling or high-occupancy vehicle lanes—we think we need some demonstrations, and certainly public education is going to be a very important component of this aspect of keeping the pressure on.

Thank you very much. Duncan and I and the other two gentlemen here would be happy to answer any questions that you might have.

Mrs Grier: Have we an awards program yet for good performance? It seems to me all that is missing.

I was struck by Mr Taylor's presentation. I guess I had not realized the contribution of industry in the distribution in emissions. Bunli Yang made the point that we could not handle this issue as acid rain had been handled, but I guess I have been having quite the reverse thought, that whereas in acid rain we were able to say, "Here are the four major contributors; let's regulate and give them a time frame"—and they in fact came down and met that time frame. There are a whole lot of dispersed sources of acid gases out there too which we may some day come to cope with, but we decided the greatest contribution to reduction could be made by targeting the big ones. Why is it so impossible to do that in this case?

Mr Taylor: I think we are saying that you have to target both, but focusing specifically on the large sources, the point sources, are the coal-fired generating and the steel industries.

Mrs Grier: Right, and the pulp and paper industry.

Mr Taylor: Pulp and paper from the use of wood waste, largely. There is another one in refineries which I did not chart up there, but that is less than half the problem. If you were to neglect actions dedicated to gasoline users, diesel users, homes, it requires action by the whole community.

Mrs Grier: I am not disputing that for a moment. It appears to me that you could get a greater and quicker bang for your buck by concentrating on those major contributors early and getting a significant reduction started there, and the message that then sends to the rest of the people you are going to try to education is, I think, considerable.

Dr Yang: You are quite right. The big industries that are energy-intensive users are certainly an important place to start. But taking a look at it too from the point of view of the industry, every dollar they save on energy goes straight through to their bottom line. This is really in their interest. Whereas with the sulphur dioxides, if there was a regulation there and they could meet it, that was fine, but it was not to their economic benefit to cut it down.

Mrs Grier: I am not sure. I think even Inco would acknowledge that—

Dr Yang: Oh, no, I agree with that now.

Mrs Grier: —having had to do it, it has been enormously beneficial to it.

Dr Yang: Absolutely.

Mr Charlton: As a supplementary on that, there was a gentleman at your conference last Friday who stood up on the floor and made the point in clear, distinct economic terms. I cannot remember which company he was from, but what he said was, "It doesn't matter whether an energy efficiency proposal or technology is cost-effective if it's not the best investment opportunity that I, as a company manager, have."

Just because something is cost-effective does not mean it is going to happen. That is the market failing you were talking about. We have to start to deal with that. If we have to deal with that in regulatory terms, then we have to deal with it in regulatory terms.

Mr Kerrio: Or third-party investors.

Dr Yang: There are mechanisms other than just regulation in dealing with it, but what I was trying to get to was, there is

actually a self-interest. It may not be strong enough but there is a self-interest perceived immediately by the industry to save energy and therefore to reduce CO₂.

The Chair: It seems to me that there is not always, in coming to terms with the CO₂ problem in our industrial sector, a self-interest that exists. I am thinking of the steel industry, by example, which is already highly energy efficient. Indeed, the capital cost of switching to an electric arc furnace approach is not going to add to their bottom line, and the self-interest would not be there. The efficiencies in other ways, in fact, may be there in keeping the front-end loader or whatever it is plugged in at night instead of in the morning. Those will add to the bottom line, but in fact the significant improvements will not add to the bottom line. Am I correct?

Dr Yang: All improvements add to the bottom line, but they may not meet their hurdle requirements. Usually, what the industry says is, at the most, what it will accept is sort of a three-year payback for any investment that it makes in energy efficiency, because usually, if it puts any kind of investment into the production side, whether this is steel, nickel or anything else, the paybacks are much quicker, on the order of one to three years. So they sort of expect energy efficiency must be reasonably competitive.

One of the challenges for our society, and I do not just mean government, in working with these industries is to say, "If you have a payback in energy efficiency expenditure which may be two to three years, which is quite good, in fact should be very attractive to you because that is a rate of return of perhaps 30 or 40 per cent, and yet you have another investment that you could make which is comparable; can we shift the balance somehow, make it possible for you to make this expenditure?"

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Whether that takes subsidy, regulation or, as Mr Kerrio is indicating, a third-party financing approach where the capital is made available by someone else, we need to develop much stronger co-operative mechanisms to get that going. I guess what I am saying here is that there is an economic self-interest that we can build on, at least.

Mr Charlton: The bottom line is, when you can get the emission reduction and you cannot get it any other way, you regulate it.

The Chair: Are you going to regulate a steel company though—

Mr Charlton: You are damned right.

The Chair: —to introduce an electric arc furnace if it means that there is going to be a transfer to hydro?

Mr Charlton: You do not have to regulate them to put in an arc furnace. You regulate them to reduce emissions.

Dr Yang: You do have to be careful. If we had, and I am not sure that we do, the most efficient steel industry in the world—let's just say we did—and yet there were still more energy efficiency investments it could make, should we be insisting that it do that, when the flip side of that is that people in the industry could say, "Well, we are the most energy efficient already." I am presuming this is the case. "It would cost us more now to go into further energy efficient things. We will shut down and move somewhere else where we do not have to be quite as energy efficient."

If that were to happen, the value added that would you get from the steel industry would go to, let's say—I do not know—the Maquiladora in Mexico or to a Third World country, where the emissions are likely to be higher. We have shot ourselves in the foot, because the emissions are higher worldwide and we have lost the value added in terms of the jobs.

I am not saying that we have the most energy-efficient steel industry, the most energy-efficient pulp and paper industry or the most energy-efficient nickel industry, but if we were to be able to do all those things, get our industries into the higher strata of energy efficiency, then it is quite a different question about the structure of our society or our industrial world structure, whether we would like to have a steel industry that still saves world emissions.

Mrs Grier: That is what we heard for years about acid rain. When we finally gave them a target and said, not "Put in this kind of furnace or that kind of process," but "Meet this target," they found very efficient and very productive ways of doing it. After all we have heard, to think that we are now beginning the "We will try to persuade, we will try to educate," approach on this issue, as we did for 15 years on acid rain, is, I find, as Ralph Torrie said, very frightening. I have grandchildren who I want to grow up in a cleaner world.

Mr Callahan: I do not believe that, Ruth.

Mrs Grier: Several.

Let me come to another question. I was pleased to hear your talk about milestones, checkpoints and guidelines along the way. I do not see them in the paper. What are those milestones? What are those checkpoints? How will we, the public, know when you have reached them or when you have missed them?

Dr Yang: The first one is quite definite in there. It is achieving reductions in the expected emissions back down to 1989 levels, at least, by the year 2000. In 10 years, we are going to try to get that hump back down to today's levels and on the way down, not just stabilized so that it goes on for ever. It has to be on the way down.

Mrs Grier: We had this very exciting presentation about the Netherlands. I was very impressed by the amount they were spending domestically on this issue. I forget the figure they gave us, but I think you today said you thought it was around \$200 million per annum. If Ontario proportionately were to put the same amount of dollars into our efforts domestically, how much would we have to spend?

Dr Yang: We have not figured that out. You understand that they have a very different industrial structure from Ontario. They are not a resource-extraction and manufacturing-based economy. They are much heavier into trade and services and banking.

Mr Charlton: Those are the best places to look for reduction.

Mrs Grier: They have about one per cent of the world's emissions; we have about two per cent.

Dr Yang: We are actually just about one per cent, as well, in Ontario.

Mrs Grier: In Ontario.

Dr Yang: In Ontario, we are about one per cent.

Mrs Grier: So is it not fair to say that perhaps we ought to be then putting the same amount of budget allocation as they are?

Dr Yang: We have about half the number of people. I do not recall the gross domestic product.

Mrs Grier: I was asking, proportionately, what would our figure be. But you have not worked that out yet.

Dr Yang: We have not worked it out.

Mrs Grier: Could you comment on the issue of growth rates and assumptions that Mr Torrie raised? We heard from Ontario Hydro that the energy growth rate it was using was still 2.3 per cent. I think you have used two per cent.

Dr Yang: It is two per cent per year annual growth rate until the year 2000. If you go from 1988 to 2005, the average annual rate is 1.9, so 1.9 per cent or two per cent.

Mrs Grier: But your two per cent is total energy demand. What estimate are you making in electrical demand?

Mr Taylor: We project to grow 2.8 per cent to the year 2000, before demand-management initiatives.

Mrs Grier: You do not expect them to do anything before 2000?

Mr Taylor: No; I am just saying that this is what we project would happen in the absence of—

Mrs Grier: Of demand management.

Mr Taylor:—those initiatives.

The Chair: What does that net out at with those initiatives?

Mr Taylor: With those, it nets out at, I think, 2.3 per cent on electrical energy, gigawatt hours, and about two per cent, or just under, if you take account of Hydro's target for peak-load shifting, which of course is just shifting peak. It does not lower energy demand.

Dr Yang: It is 2.3 per cent.

Mrs Grier: Do you agree with Mr Torrie that the assumptions in the growth rates used by the Department of Energy, Mines and Resources in the DPA study, or whatever it is called, were higher than that?

Dr Yang: Yes, they were higher.

Mrs Grier: What were they?

Mr Taylor: I can answer that for Ontario. They assumed an electricity growth of 3.4 per cent a year, and as far as I am aware—and it is hard to tell from their study—they did not allow for incentive-induced efficiency gains etc. It just gives the growth and it is going to be met by new supply.

Dr Yang: That projection done by the Department of Energy, Mines and Resources was done before Hydro announced its targets and demand management program and all that. So they do not have demand management built into that forecast.

Mrs Grier: So they have not updated their estimate since 1989.

Dr Yang: They probably have, but they have not changed those assumptions.

Mrs Grier: The DPA study and the minister's task force came to the conclusion that by doing virtually everything that was technically feasible, they could reach the 20 per cent.

Dr Yang: No.

Mrs Grier: Well, they say that the Toronto Climate Conference goal can be achieved but only by doing virtually everything that is technically feasible to reduce CO₂ emissions.

Dr Yang: The DPA study was a consultants study done for the task force, which actually did conclude that you could just about do the 20 per cent reduction. But what they assumed in that, everything technically feasible, was eliminating all fossil-fuel-generated electricity in Canada and supplying with nuclear and hydraulic, without any consideration—because they were not asked to; they did not have the time—of the transmission costs that would be involved with that.

Effectively they were saying there would be no more utility plants in Alberta, none in Nova Scotia and that it would all be serviced by Quebec's and Ontario's nonfossil electricity. That was a very large component of the reduction in the DPA study. The task force, upon receipt of the DPA study, thought that might be a controversial assumption. To use Ralph Torrie's comment, the task force massaged the DPA study because it was not accurate.

Mrs Grier: Consultants' studies usually are massaged.

Dr Yang: The task force looked at a range of electrical generation substitution options, including natural gas, which I have indicated has some problems of its own, as well as some mix of expansion of nuclear and hydraulic to back out coal plants as they reach an end of their normal lifetime, and tried to look carefully at emission reductions, and concluded that even with all the technically feasible measures, which, by the way, are not cost-effective necessarily, getting to the 20 per cent target would get us something like just under 80 per cent of that 20 per cent reduction—these numbers keep floating around, different percentages—four fifths of the way to the needed level of reduction.

There is a critique of that that could say, "You started off with such a high demand forecast that you have made it an impossible target to achieve that kind of reduction." The only excuse I can give you is that the task force is a national task force. To get all the provinces, the territories and the feds to agree on the base line is hard. So we took what was available, the Department of Energy, Mines and Resources energy demand forecast, recognizing that it was likely to be high.

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Mr Taylor: If I could also comment, I do not think it would serve us to take a lower demand forecast and make us more complacent about the ease of achieving any target. We derive our energy demand forecast by saying this is where we expect the economy to go based on looking at projections derived by other people and based on expected population growth. If we chose a lower forecast, it might be easier to achieve reductions but it would not be serving us.

Mrs Grier: Oh, can I respond to that? I get the strong sense that what we are being told by you is we cannot meet that target so we, in effect, throw up our hands and try to persuade and educate.

Dr Yang: Oh, no. We are trying to take committed actions, such as this empowering of utilities to earn a rate of return on their conservation expenditures. Some people may not under-

stand this yet, but that is a sleeper in the sense that the gas utilities may then be able to spend on the order of the same kind of spending you are seeing from Ontario Hydro.

Mr Charlton: We may even have them outrun Hydro.

The discussion has had an interesting evolution in the last few minutes and I will pick it up there. Dr Yang, you were talking about market failings, and there have been a number of other failings in many respects in energy terms, in my view. You made an interesting distinction between senior bureaucrats and politicians. Perhaps we can pick it up there. I cannot remember which of you mentioned it.

The Chair: Simply a different level of politics.

Mr Charlton: I am getting to the stage where I cannot remember who said what, but it was one of the overheads that was up there. You had a list of things that are already under way in some fashion to start to address some of the energy efficiency questions and energy use questions out there where the government has a role to play.

One of the things you mentioned was building code changes that will deal with the energy efficiency of buildings. Can you tell me where that is at? What kind of standards are being recommended?

Mr Moore: I think I can help you with that. There has been about a three-year-long effort to bring forward substantially increased energy efficiency levels, basically new insulation levels, for residential dwellings. This includes full-height basement insulation, substantial increases in wall insulation—

Mr Charlton: Yes, ever since the select committee recommended it in 1986.

Mr Moore: That is right, part of the thrust for that was the recommendation from past select committees, no question. That proposal has now passed through all the public review processes. There were strong objections, particularly to the full-height basement insulation component, from the housing industry. Basically they are saying, "It's going to take more time for us to get sorted out on how to actually do this so that we don't have problems." In any case, we expect that the Minister of Housing will very shortly be recommending some portion at least of those insulation requirements and that inevitably the whole package will be in the code within the next one or two years.

Mr Charlton: That raises the next part of my question. How much were those originally proposed improvements in the building code standards going to get chiselled away at before we end up with new standards in the code at the end of the process? I guess you obviously do not know at this stage what the final implementation will be; as you have said, some portion of the new insulation standards, for example.

Will we be able to have some discussion, for example, in this committee? Would the ministry be prepared to talk to us at that point about where the recommendations started out, where they ended up and what the rationale for that was so that we can have a serious look in the political arena? Obviously we know how these things happen. When building industries lobby politicians, then bureaucrats get told to down the ante a little bit. Perhaps it is time we got some of that out into the public political arena.

Mr Moore: Just to add to the answer, I can say the Ministry of Energy staff right to the top have supported this proposal fully.

Mr Charlton: I am not blaming the staff; I know what you guys are up against.

Mr Moore: We have supported the proposal fully, we want the whole package in and we are quite confident that the whole package, without any chiselling, will be in fairly shortly. It is possible, though, that the whole package will not be in the 1990 code; that is possible.

Mr Charlton: In other words, some kind of a phase-in of parts of it or something?

Mr Moore: That is right, yes.

The Chair: We will have to wait for the minister to announce that.

Mr Charlton: The same is true—and I raised this question last Monday with the minister when she was here—around the Energy Efficiency Act and appliance standards. I know you bureaucrats, along with politicians, have had discussions with the industry, but at some point I think those discussions have to move out of the back rooms and into the public forums so that we can understand why we are not going to be moving to the kinds of efficiency standards in the province of Ontario that we know are technically possible, that are cost-effective, that are being pursued elsewhere in the world, and why our standard is going to run considerably not only behind what is technically possible and cost-effective but why it is even going to lag behind our neighbours, who are lagging behind the leaders.

At some point we have to get those kinds of things out into the public part of the debate, because we are saying on the one hand we cannot meet this, we cannot meet that, we are going to try our best but we are probably not going to get there, at the same time as we are admittedly doing less than what has been identified as the real potential. I would like some comments on some of those things.

Mr Moore: One thing that might make you feel a little bit more comfortable about that is actually just earlier today I met with a whole range of public interest groups, ranging from Energy Probe to Pollution Probe, Greenpeace, Friends of the Earth, the whole lot. I undertook at that time to put the next draft regulation that we produce—that will be on air-conditioners, heat pumps, probably electric motors, one to 200 horsepower—before them for their review before it actually goes to regulation. So we really do intend to make this regulation-setting process more open. Certainly any suggestions that members of the committee have in terms of the regulation process we would welcome, because we want it to be open, we want the input from a broad spectrum.

The Chair: You can do that in a later meeting.

Mr Charlton: We can do it in any number of ways, as long as we get it out in the open where it has not been until now.

One thing that concerned me in the presentation today, and it has concerned me about a number of the presentations we have had on this issue, is, from my perspective, an overfocus on what does it mean for Ontario, or what does it mean for northern Ontario, or what does it mean for the Prairies, or what does it mean for Canada.

It seems to me we run the risk, if we play that game too much in specific terms, of creating a scenario that we used to have in our debates with Hydro called the "no losers test." This is a global problem, and regardless of whether global warming may benefit Ontario or may harm Ontario, I think we all understand from the basic scientific evidence that we have heard and

the basic projections from those who have spent the most time working on global warming that it is a problem for this planet.

I think we need to stop playing games around what is the impact going to be for Ontario and deal with it as a global problem, much as you suggested in your comments earlier, in terms of consensus building internationally rather than, "Perhaps we don't have to do as much in Ontario because the impact isn't going to be that bad anyway".

Dr Yang: We agree with that. In fact, one of the reasons for the timing of all this—the 2 March symposium, these select committee hearings, the series of staff consultations that are going forward in the next several months, the workshop that is going to be conducted in the late spring—is not only do we think we have to anchor it in terms of Ontario impacts and what is good for Ontario, but also we have to keep pressure on the feds. They cannot cite this—"Oh well, we are trying to broker and negotiate an international agreement"—as a smokescreen for inaction.

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Mr Callahan: That is right.

Mrs Grier: But they can do it and they will.

Dr Yang: It will be hard, we think. If Ontario is the heartland where much of the energy is consumed—we consume perhaps 40 or 42 per cent of Canada's energy—we understand we are responsible for much of the emissions because of our industrial economy, our level and quality of life. It is not just industrial output, it is also how we use cars, our employment, our cities and all that. We are accepting responsibility as a societal unit, not just as government, not just as industry, but all of us together. We are saying to the feds, "You can't just keep saying, 'Oh well, let's wait for the developing countries' and the industrialized countries' consensus.'" That is one heck of a problem to sort out, but we cannot let our own federal government say, "We're not going to take any steps until that is settled."

We think that when we can demonstrate that governments can grapple with an issue, take some leadership—I made sort of a distinction between politicians and senior bureaucrats. It was a jocular reference, but you have to sympathize with the bureaucrats who have to be here for a long time. We have to "weather the storms."

I think we have really come a very long way. At the beginning of my bureaucratic career I served as an operations research analyst on the US corporate average fuel economy standards, as a matter of fact. At my first meeting with Chrysler—this was just after the first Arab oil embargo—they sat down and they said flatly: "It's technologically impossible, on a fleet-wide basis, to produce cars that have fuel efficiency of more than 30 miles per gallon. That's just simply not technically possible." I do not want to tell you how many years ago this was, but this was before the CAFE standards.

What we have seen here: In 1979 we started our effort on propane, lifted the road fuel tax off propane and alternative fuels. In 1980 I was pleased to be part of changing the regulation—it sounds pretty pedestrian—so that natural gas could be sold. In the past, only the utility could sell natural gas. We changed the regulations so that you could have somebody else sell it, a gas station. In 1987 I was involved with this Energy Efficiency Act, which we think is still a real milestone in Canada. Agreed, the US had already done it, in the spring of 1987, when we had first reading in December 1987 and finally passed it in June 1988.

But we are having a tough time bringing the feds on side and this is really a national issue. So where the heck are they? The same thing with global warming. We are trying to pull them along and we need the sharp light of public scrutiny to keep that pressure on.

Mr Charlton: That brings up my last question, and this will be a short one. You have made the point that there is a lot of pulling along that has to be done, and nobody agrees with that more than I do. The more tools that we have to pull the feds, to pull the politicians, and ultimately to pull industry and the public along with us too, the better. You have done a good job in terms of having a number of energy issues researched in studies. Are you prepared to proceed as quickly as possible to have the kind of study that Ralph Torrie talked about done in relation to CO₂ emission reduction, so that committees like this one that have to deal with the ministers in the Legislature and through recommendation processes can look at blocks of technically potential CO₂ emission reductions and at what cost?

Dr Yang: Let me submit to the clerk of the committee not just the national task force report from August 1989, and the energy ministers' communiqué which reports what they think the task force did, but also the DPA study, volumes 1 and 2. The DPA study has some flaws. Our own analyses internally—they are going to surface over the next month or two—will be assessing the DPA analysis as applied to Ontario and show some of the weaknesses of it. But the DPA study was a bit of a watershed in itself for the country because it assessed across the country just exactly what you said: the costs and benefits, on a unit basis, of various ways. I think there were 142 conservation measures and 49 related to electrical generation. It is a pretty complete list.

They made some mistakes because the task force forced them to do it very quickly. We did not give them very much taxpayer money. We were quite cognizant that we would be critiqued if we spent too much. Ralph Torrie indicated maybe four or five people for six months. These guys did a very quick job in less than three and a half months on a limited budget. Except for that thing about nonfossil substitution for all electricity in the country, we thought they did a very fine job on budget and on time.

That is being assessed regionally across the country as we speak. Each jurisdiction agreed to take away that set of measures to try to assess regionally what that meant, because in Quebec there is a lot of electrically heated homes but, of course, there is no CO₂ associated with them because they are all—there is some methane probably—hydroelectric. In Saskatchewan, they have only gas-heated houses and oil; no electric.

So circumstances differ widely across the country. They are being assessed. Duncan Taylor is in charge of what we have been doing in the ministry. We have been finding some double counting. We have not really tried to "improve" at all, but I think soon in the public there will be some conclusions. At the 2 April energy ministers' meeting we are hoping to have all those regional assessments.

The Chair: I would like to point out that the author of that report will be our witness tomorrow morning, so we will be able to discuss some of those issues with him.

Mr Callahan: It is interesting. I have been here all week—and unfortunately I will not be here tomorrow—but I have seen very little interest by the press. They may be monitoring us from another area, because there are stories in the paper, but it

seems to me that the issue really does not become important until it hits a hole in the ozone layer or until it hits, as in my riding, in Brampton, where we are having difficulty in terms of brownouts or potential brownouts. And that is not because of supply; it is because of transmission problems.

We had a meeting with our Hydro people and they were telling us about a lot of the things they are doing in terms of the offers they are making to prospective industries to go out and redo their lights to try to constantly conserve. I tried to get Mr Torrie to admit that—and I guess I did it through devious means—natural gas was the beauty so that I could really hang one on the feds about Consumers' Gas, because it really frightens the hell out of me that they are trying to sell that outside this country. But I think he would not agree; he said conservation. So maybe we have to come up with innovative ways to bring people along to make them realize that because it is a generation away or two generations away, the bottom line of the profit motive and pleasing the shareholders now is not sufficient; you have to look at it in terms of what is going to happen later on. Maybe we can do that by some incentives. This province from time immemorial has provided loans—not grants, but loans—to redo an old house to make it more efficient from the standpoint of energy. Maybe that is the thing we should be looking at.

But I think that until it hits home, until the situation is really there, it is up to us to move it along. But I think it demonstrates that people do not believe that that is a real problem. That is not a question; that is a statement.

The Chair: Do you have a question?

Mr Callahan: Yes, do you want to go home?

The Chair: I have one more short question from Mr Kerrio.

Mr Kerrio: This is rather in the form of a statement, as well. I, as well as most of the people on the committee, was very much impressed with the presentation by the Netherlands and subsequently by today's presentations. It seems like one of

the very natural things to do is to address the whole question of reforestation as an immediate way to deal with the buffering or however you want to describe that element. Ontario Hydro has taken the initiative on it. There are many jurisdictions across the province. In my former emanation as Minister of Natural Resources, we were fighting the federal people for transfers of \$150 million to plant trees in Ontario, which had been an agreement between the federal and provincial governments where there were major funds transferred for planting, for reforestation.

Now we are at this point where we are trying to convince the federal government that we have to not only do the things within the provinces and the country but also address the global warming and become involved as global citizens to do this. And while we are trying to get them to take some initiatives on the very basic thing, in the planting of trees and reforestation, the funds are not available. I thought that at this point in time, to show goodwill on that very basic premise that would help this whole process, the moneys could have been put up front to show that we were actually on our way to doing it.

The reason I did not put it in the form of a question was because we put you bureaucrats very often on the spot and I did not intend to do that. Rather, I would hope that we could convince the federal government that the transfers have to made; that it is a very first step, if you want to describe it that way, in dealing with this very important issue. So I hope that that message might get delivered.

Mr Callahan: Amen, brother.

The Chair: Gentlemen, I want to thank you very much for joining us this afternoon. We have kept you a full hour after we promised you would be out of here, but I think that is also a measure of the interest of the members of the committee in this issue and of your expertise in dealing with it in Canada. Thank you very much.

The committee adjourned at 1750.

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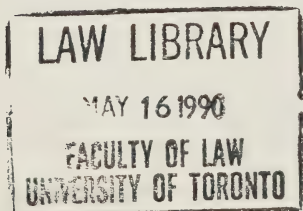
Le vendredi 9 mars 1990

Select Committee on Energy

Global warming and the
Greenhouse Effect

Comité spécial de l'énergie

Réchauffement planétaire et
l'effet de serre



Chair: Barbara Sullivan
Clerk: Todd Decker

Président : Barbara Sullivan
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LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Friday 9 March 1990

The committee met at 1009 in room 151.

GLOBAL WARMING AND THE GREENHOUSE EFFECT (continued)

The Chair: I think we are ready to begin this morning's hearings. I would like you to know that there will be a slight change in the area. After our first witness's report or presentation to us, we are going to invite Dr Danny Harvey, our resource person, to speak to us and clarify some of the issues that have been raised in the testimony before us at this point, and then I would like to have a consensus on whether we should break at that time for lunch and come back after lunch or whether we should work right through, to determine what our next steps will be.

Mr Kerrio: I like your second one.

The Chair: Work right through: Is that the consensus?

Interjections.

The Chair: Good.

Mr Brown: I have a luncheon appointment.

The Chair: All right. Thanks very much.

ERIK HAITES

The Chair: I would like to welcome Dr Erik Haites, who is presently a principal with Barakat and Chamberlin, a Toronto consulting firm specializing in energy and environmental studies. In 1969, Dr Haites received his PhD in economics at Purdue University and has since gained 20 years' experience as an economic consultant. He has published numerous papers, including *Energy Use and the Greenhouse Effect*, *Options for Reduction of Energy-Related Greenhouse Gas Emission*, and *Natural Gas and the Greenhouse Effect*. He was the principal author of the DPA Group study for the federal-provincial inter-governmental committee.

Dr Haites: Good morning. I am pleased to be here today. I noticed the clerk distributing the two volumes of our report this morning, so I take it that none of you have memorized it yet.

Mrs Grier: Over the weekend.

Dr Haites: Yes. It is very detailed and I felt that it would be most productive of me not to try to work through that in detail, but rather to give you a few of the conclusions and then my personal judgements on some of the policy implications as the basis for discussion.

The report that we prepared to the energy ministers' task force had as its objective to determine the most cost-effective means of achieving one of the goals of the Toronto climate conference; namely, a 20 per cent reduction in carbon dioxide emissions by the year 2005. In the report we discovered that:

1. That goal could be achieved, but only by doing virtually everything that is technically feasible to reduce carbon dioxide emissions over that time period.

2. Achieving that goal will save energy and will produce substantial economic benefits to society.

3. Strong policy measures would be needed to achieve that goal, and despite the economic benefits that occur as a result of the measures to reduce carbon dioxide emissions, market forces alone would yield only a small reduction in carbon dioxide emissions.

4. Improved energy efficiency is generally the most cost-effective means of reducing carbon dioxide emissions. Efficiency measures are able to achieve up to three quarters of the target reduction by 2005.

5. The balance of the target reduction of carbon dioxide emissions comes through substitution of nonfossil generation for fossil-fired generation.

6. Because the strategy to the year 2005 emphasizes improved energy efficiency, additional reductions in carbon dioxide emissions beyond that date—the Toronto climate conference anticipates an ultimate objective of cutting emissions at least 50 per cent from 1988, so further reductions in emissions beyond 2005 are contemplated in that target. After 2005, the reductions in carbon dioxide emissions will have to come proportionately more from the displacement of the use of fossil fuels and less from the improvement in efficiency of the use of fossil fuels.

7. Finally, a bit of a caveat: The study had as a specific focus the most cost-effective ways of reducing carbon dioxide emissions. That focus is only one of the objectives of our society. We have others, such as reducing regional disparities, stimulating economic growth and so forth. The measures identified may not be the best set of measures once all of those other objectives are included. We do believe that they are the most cost-effective measures from the perspective of that one objective.

As I have said, strong policy measures will be required to achieve the goals of the Toronto climate conference. I would like to briefly propose a few policy measures that I think will be necessary to reach these targets.

First, Canada will need stronger and more comprehensive energy efficiency and emissions standards for vehicles, appliances, buildings and any other equipment that uses energy. Canada's vehicle emissions standards have historically been below those of the US, and in Canada, only Ontario has adopted appliance efficiency standards.

Second, energy taxes may be required to induce consumers to minimize their use of fossil fuels. Without price as an incentive, there is virtually no way to regulate the thousands of decisions consumers make that impact energy use. Large taxes on fossil fuels may be necessary to reduce consumer reliance on these fuels and to speed the development of alternatives.

Unpopular as they are, energy taxes help reflect to consumers the true environmental costs of fossil fuels. If energy taxes are large and roughly proportional to their estimated environmental impact, they will create a strong incentive to use these fuels efficiently and to develop and adopt nonfossil technologies.

These policy decisions will not be easy and probably will not be popular. They will draw fire from many quarters, but it is

a quirk of human nature to persecute those who try to save us. Policy direction is, however, necessary. We are discovering that it takes very little conscious effort to foul the global environment. We are also discovering that it will require concerted, sustained and widespread effort to reverse our habits. If we do nothing, we will achieve nothing but disaster.

Thank you for your attention. I will be happy to answer any questions.

The Chair: I wonder, Dr Haites, if you could review with the committee, while I am compiling a list of questioners, some of the specific sectoral problems in terms of emissions.

Dr Haites: Perhaps I should talk a little bit more in terms of the specific study that was done. At the time I was with a firm called the DPA Group and it was selected through a competitive tendering process to conduct a study that was officially contracted by the Ontario Ministry of Energy, but was funded by all of the federal and provincial ministers of energy.

That study was the first detailed analysis of methods to reduce carbon dioxide and other greenhouse gas emissions in Canada. It was done in a three-month period from January to March of last year to provide input to the task force.

Apart from the very tight time deadline, we had another restriction on us, and that was that we used only readily available material and did not consult with industry or other groups because the energy ministers were contemplating a public consultation process and did not want our questioning and solicitation of input to disrupt their proposed process. So we made use of available materials for our analysis.

The analysis, I think, mirrors what has been found in other parts of the world; namely, that there are no huge sources of carbon dioxide where we have a quick fix. We have literally thousands of sources, and almost all of them are relatively small. If you are going to have any significant impact, you have to deal with thousands of small gains or thousands of small reductions in emissions. There is nothing that represents 50 per cent of the total where we can get a big impact. Five and 10 per cent of the total is large, and then you have to make your savings on those kinds of items.

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We can go through the sectors. The sources of carbon dioxide emissions in Canada by sector are roughly 30 per cent for the transportation sector, roughly 30 per cent for the industrial sector, a little under 30 per cent for electricity generation and 20 per cent for the residential and commercial sectors combined.

Within each of those sectors, for example, the transportation sector, we have an automobile fleet, aircraft, ships, rail and trucks, all serving various purposes, although the energy use in that sector is dominated by automobiles, but then the kinds of measures that are available to reduce carbon dioxide emissions from automobiles include improving the efficiency of the automobile and then changing the use of the automobile. Those two kinds of strategies, depending on the use of the automobile, whether it is as a commuting vehicle in urban areas or for intercity travel, again raise a range of different options for reducing the fuel use. So the closer you look at the emissions in any one area, the more complex it becomes to try to cut back on the carbon dioxide emissions.

Mr Brown: I wonder, in looking at this, did you look at it in net? We have been told about sinks and about how trees, for example, store carbon. When you are looking at a 20 per cent

reduction, are you talking about a net after taking into account that perhaps the thing to do is plant a large number of trees and forests and therefore create or take more carbon out of the atmosphere?

Dr Haites: Again, because of the time frame we had and because the interest of the energy ministers was on the implications for energy use, we did not deal with forestry as an option in this study. But certainly it is recognized as one of the potential ways of dealing with carbon dioxide emissions.

Mr Brown: The other thing that we are having a great debate on in this country, or unfortunately perhaps it is just about over, is about rail transportation. Could you give me some idea of the relative energy use in rail versus automobiles in the transportation sector? I recognize that there may be not a whole lot of pluses there in the remote areas, but through the major transportation corridors of this country I would think that there would be significant energy advantages, at least in terms of fossil fuels.

Dr Haites: I was asked two weeks ago to make a presentation of this sort to the royal commission that is studying that issue. The information available on the energy use and the volume of passenger travel by corridor is not sufficient at the moment to allow us to make a very accurate comparison there. I think that is an area of research that the royal commission will be getting into.

To answer your question in general terms, if you compare trains with relatively high occupancy to cars with an average of two people or less on intercity travel, then the energy efficiency of rail would be higher than that of the car on a per-passenger-kilometre basis, but it is very critically dependent on the occupancy of the train. If you are running a train with very low occupancy, it is probably much less energy-efficient.

Mr Brown: Of course, it also applies not just to people; it applies to freight. It seems to me that we are seeing dramatic increases in the number of trucks on our highways. It seems to be, for whatever economic reasons, the way to move anything but bulk freight. What is the mix there? Are we fooling ourselves by having not enough energy taxes on what the trucks use versus what a train might do the same thing for?

Dr Haites: Again, you are right. I think we have been moving in the direction of more of the freight moving by trucks and rail is generally a more energy-efficient way of moving the freight. I think the economics of that shift relate more to the fact that with the smaller loads that you can move on a truckload basis the goods are tied up for shorter periods of time, and so the economic savings in terms of the lower inventory-carrying cost are enough to offset the differences in the freight rates. I think if we had, let's say, energy taxes or environmental taxes or a carbon tax that changed the relative energy costs of those modes, then it would certainly switch back a bit. But the inventory-carrying costs depend on the value of the goods, so you would get, again, some of the lower-valued goods coming back to rail, presumably.

Mr Brown: It is not just that, either; it is a matter of the labour costs involved when you are shipping. If you have to ship something three or four times, it is obviously going to cost more than just doing it once.

Mr Charlton: Not having had the opportunity to go completely through this yet, I may be asking questions about things

that are right in front of my face, but I have not found them yet. Starting out with figure 3.5 and 3.6 in the study.

Dr Haïtes: You have me at a disadvantage because I do not have that one. Is this the one?

Mr Charlton: Yes.

Dr Haïtes: This report was done by the staff of the various ministries of energy across the country. We had no input into this.

Mr Charlton: But this came out of yours.

Dr Haïtes: Chapter 3 did. The rest came from others. Chapter 3 is based on the other two volumes that you have, which is the report that we prepared. The other chapters in this document without a cover were all drafted by people in the different energy ministries.

Mr Charlton: Turn to figure 3.5.

Dr Haïtes: To 3.5?

Mr Charlton: Yes. There is a series of figures, 3.5, 3.6, 3.7 and 3.8, which I would like to talk about. Did this data come out of your study?

Dr Haïtes: Yes, it did.

Mr Charlton: That is what I thought. Okay. First of all, I am trying to determine precisely what it is that is being said here. You have "base case measures economically attractive to society" and "base case technical potential," both of which determine a net benefit to society. What is the basic difference between the 160 and the 234 megatonnes?

Dr Haïtes: The technical potential is the maximum amount of carbon dioxide reduction that we felt could be achieved by 2005. Some of those measures have significant costs to implement; others have net savings in the sense that the energy saved more than offsets the cost of installing the measure. The ones that are economically attractive to society are measures where the energy savings are more than enough to offset the—

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Mr Charlton: As individual installations, or alterations or—

Dr Haïtes: That is right.

Mr Charlton: So the difference, basically, between the two tables is that the difference between the 160 and the 234—those items that fall into that range are not necessarily cost-effective even though as part of an overall package they still provide a net benefit to society.

Dr Haïtes: That is correct.

Mr Charlton: Individually they are not cost-effective.

Dr Haïtes: That is correct.

Mr Charlton: We were basically told yesterday afternoon, around some questioning of ministry officials, that your study provided a situation where we could look at blocks of potential emission reductions and their costs. Where do we find that?

Dr Haïtes: It would be appendix E in the second volume, right at the back.

The Chair: I would just like to insert a question here that follows, on Mr Charlton's area of questioning. I think we are

floundering around a bit because members have not had a chance to go through the report. One of the things that I am very interested in is that industry itself, we know, is about a 50 per cent contributor to the emissions. I am looking at your exhibit 3.4 of the DPA study, looking at measures that affect the demand for electricity with the technical potential, the economic potential and then the market penetration analysis. By example, I look at cogeneration or process change where, say, under the process change you have indicated that you feel that while there is the 12 per cent total energy saving, the economic potential would be about 30 per cent; the cost would be close to \$6 billion.

You have also done a cross-referencing on what the effect would be on other sectors. By example, the one that I tend to use—I suppose it is down here further—number 13, arc furnace processing, as the illustrative example: Were our steel companies to move to electric arc furnaces, what would the impact be on Ontario Hydro in terms of its demand-supply planning? I wonder if that has been taken into account, that kind of tradeoff for other processing. Also by example, as I look here at laser processing, which is very much an emerging industry, have you taken into account developmental costs in your economic costing and so on?

Dr Haïtes: To answer the first question first, the implications for other energy users are incorporated. To explain that with the arc furnace, in this particular instance we looked at arc furnaces as a method from steelmaking. To the extent that process was estimated to be implemented, we calculated the savings in the fossil fuels and the additional demand for electricity. When we had done the analysis for all the fossil fuels, we added up the additional demands for electricity that were created in the process, and we also looked at a whole series of measures that could be used to reduce demand for electricity: more efficient lighting, for example; more efficient electric motors.

We estimated the savings in demand for electricity from those measures, added in the additional demands for electricity that we had created before and got the net impact on the demand for electricity and then looked at how that would be generated. So those interactions are taken into account. We did not go beyond that and say, "What would be the effect on the engineering firms that make arc furnaces?" But we did address the impacts on energy demands.

Mr Kerrio: There was also another step beyond regular arc furnaces in plasma arc, which is a dimension that goes that other step beyond. Was that considered as well in that whole process?

Dr Haïtes: It was considered. You are testing my memory because we have a couple of hundred of these things that we looked at. I believe we estimated that the arc furnace would be commercially in place by 2005, but probably not the plasma arc. What we tried to do was—this gets back to the chairman's other question—consider only technologies that we felt would be commercially viable by the mid-1990s. We were not looking at speculative technology development. So that is really the same answer with respect to the lasers.

The Chair: Because your net measure costs, I assume, tend for the most part to be new capital costs over a 15-year period between now and 2005, did you take into account the costs of the write-off of existing equipment, disposal of existing equipment, and capital financing costs that would be involved in new processes or switchovers?

Dr Haites: The net measure cost is the capital cost of installing the measure less any energy savings realized by the firm or the home owner over the life of that measure. So a fridge with a 10-year life is calculated over 10 years. If it was something with a 25-year life, the energy savings were calculated over 25 years. The measure cost is not calculated over the same period for every measure. It is calculated over the life of the particular measure.

The Chair: Which may not be equivalent to the capital financing period.

Dr Haites: That is correct as well. The assumption was made in each case that the measures would be installed at the time of normal replacement, so we did not make any assumptions about accelerating the scrappage rate.

The Chair: Thank you. That is one of the things that I was trying to get at.

Mr Kerrio: We have had a fair number of people before our committee and some of the givens now seem to surface as something we are going to take into account. This whole process that we are looking at, the global warming, is a very major international problem. It must be dealt with. There is no question about that, and the sooner the better. I think the one thing that seems to arise as a top priority is the conservation aspect of this whole process.

I am disappointed that we have left some of the very good programs, like the corporate average fuel economy program in the United States of America, which was going to give us very good economical benefits in our automobiles. Somewhere in the middle of that whole process, and probably because of the cost of fuels going down all of a sudden, it does not seem to be the problem. But it does not address the global warming and that aspect of it. As I have said, that was a very big disappointment.

One thing I wondered about is if there was any in-depth examination of conservation methods that have been put in place in whatever jurisdiction, because now we are talking internationally, that have in fact been very successful. I can think of one in our own jurisdiction, and that is municipal lighting, which seems to have a very short payback, and cut back on the demands of electrical energy.

Has there ever been a study made in pursuing every jurisdiction that might have put something in place that has a quicker payback as a sort of a guideline to start with and then work into those areas where the payback becomes, in terms of years, longer and longer and not quite as attractive as those short-term paybacks? Has there been anyone who pulled together that kind of an investigation or something to work from as a basis?

Dr Haites: Not to my knowledge. I wish I had, but I do not know of a study that has comprehensively tried to do that.

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Mr Kerrio: Finally, maybe as more of a question for our committee, I also note that many of the people who come to give evidence before us have to assume that we are using the same numbers as to how much is in the atmosphere on what our programs are going to be. I just wondered, at this point, whether we should not be examining some kind of a structure for the committee to share the fundamental givens of people who come before us. It may be helpful and I do not know how you might respond to that kind of initiative by the committee or the group.

Dr Haites: I think that would be helpful, undoubtedly, for you and helpful for other people as well.

Mr Cureatz: To follow up on Mr Kerrio's question: Vince, you are saying that there is such a discrepancy in terms of the figures that we are using about the amount of CO₂ that is in the air that we should have a working familiarity and then discuss that prior to the witness coming here so that the witness can say, "Well, that's not how I look at it." Is that right?

Mr Kerrio: Exactly.

Mrs Grier: Following up, I think, on Mr Kerrio's point, I look at your appendix E, which I was interested in because in other energy committees we have gone through looking at Hydro's penetration of conservation measures. If I remember the discussion around that correctly, it was that it was difficult to make accurate guesstimates as to the penetration in the absence of any demonstration projects.

We heard from the Northwest Power Planning Council that it had done a conservation for a community of a certain size and, when I look at the various sectors in your appendix E, it is helpful to have the assumptions laid out. But do I take it from that that they are all based on assumptions, that there have not been actual concrete studies and test programs for this kind of thing?

Dr Haites: I guess you can get reasonable concurrence on estimates of technical potential—in other words, the maximum penetration—and I think that Ontario Hydro would probably agree that is a calculation that can be done. That is the starting point for the calculations we did.

The second level of penetration that we estimated was measures economically attractive to society. You can define that in terms of a calculation on whether a measure is or is not attractive. That, again, is something that you can have some degree of confidence in.

The estimate of penetration, either with no policy measures or with some form of incentive or policy measures is one where you do need the program experience in order to make some solid estimates. Frankly, there is not much of that available and our estimates of market penetration have to be considered as probably very speculative.

Mrs Grier: We had some discussion yesterday around the assumptions of energy demand and economic growth that underlie your studies as opposed to those by Hydro or by the Ministry of Energy. Are your studies in such a form that you can give us any conclusion? Perhaps I should be more specific. What assumptions of energy demand growth underlie your studies?

Dr Haites: Again, because we were providing input to the overall exercise of the task force, the task force had already decided that the basic energy demand forecast would be the forecast prepared by the Department of Energy, Mines and Resources using their model. We were simply told, "Use that as your basis."

Mrs Grier: And what was that?

Dr Haites: That is described in chapter 2 of the report we did not do. I believe the energy growth is roughly 2.3 per cent per year to 2005.

Mrs Grier: I forget, yesterday, what our Ministry of Energy's assumption is—somewhat less than that?

Dr Haites: Somewhat less than that. I think there is general agreement that this forecast by EMR is among the higher forecasts of growth and demand for energy. It has some characteristics that I guess I am not totally comfortable with. It is an econometric model, so the energy prices play a relatively important role in it.

They had rising prices of oil and natural gas, a declining price in real terms for electricity and a constant price in real terms for coal. If you go through their resulting forecast, you find that the demand for electricity grows faster than the demand for gas and oil and that to generate that electricity you use more coal. That is hardly surprising given the assumptions on the prices.

Mrs Grier: Is it fair to say then that if you played with a number of aspects of the assumptions that went into that 2.3 per cent, you might well come out with a result that would lead you to a conclusion that only by doing everything technically feasible could we reduce the CO₂ by 20 per cent, the Toronto climate conference target, and that in fact you could arrive at a different conclusion if you varied some of the assumptions underlying that conclusion?

Dr Haites: I am not sure what the Ontario Ministry of Energy's growth rate is, but let's say it is two per cent instead of 2.3 per cent or even 1.8 per cent. The difference in growth is not enough to change the substance of that conclusion.

Mrs Grier: Even if you find that there are significant flaws in the assumptions on electricity demand or electricity pricing, the pricing one, I think, is the one that is probably most vulnerable to challenge, because we do not know what is going to happen when Darlington and the others come on. If in fact that is the case, would that change the situation?

Dr Haites: There are two ways of looking at it. It depends on what you have as your base case and what you define as your policy case. In the EMR forecast, it had, I believe, just the completion of the Darlington station with no additional nuclear capacity. Ontario Hydro has since submitted a plan that involves construction of additional nuclear stations. That might well give a different base case or you can interpret Ontario Hydro's plan as partially responding to the concerns of greenhouse gas emissions and, hence, having already changed the mix of generation from coal to nuclear as a way of dealing with that.

Mr Charlton: I go back to where I was when I started digging into stuff here. Having determined that the basic difference between the 160 megatonnes and the 234 megatonnes of potential emission reductions was cost-effective versus not cost-effective, it would seem to me, net, that what we are looking at is about \$36 billion between the two scenarios, that theoretically, if the government decided it had to go after all of the technical potential, probably the public would have to make that up in some fashion. About \$36 billion?

Dr Haites: Yes.

1050

Mr Charlton: Okay. Now, to what extent in that defining of economically attractive versus technical potential did you take into account—was that all done in current circumstance, or did you do any adjusting for things like, for example, the applications of carbon taxes or other disincentives that may make some of the rest of the technical potential more economically acceptable?

Dr Haites: I have two points and I will answer the second one first. We again, were restricted to doing a technical analysis with no presumptions on policy. We evaluated all of these measures in terms of the EMR forecast of energy prices as of the mid-1990s, because we felt that was sort of the midperiod at which the measures would be implemented, and we took that as the date of implementation, and we used the base case forecast of energy prices at that point to do the evaluation.

Mr Charlton: So there are no policy implications in numbers here.

Dr Haites: No.

Mr Charlton: So it is fair to say that if this committee and ultimately the government were to consider pursuit of the total technical potential necessary, then you start looking at policy options to deal with that \$36 billion. The policy options may be fuel taxes to raise the money for a public investment in the additional \$36 billion, or as disincentives to cause it to happen by itself, or whatever, but that potential is not necessarily an insurmountable one in the context of where we go from here.

Dr Haites: No, and the other point is that even with the technical potential with that added \$36 billion cost, there is a net saving overall if you implemented everything.

Mr Charlton: On the whole package.

Dr Haites: On the whole package.

Mr Charlton: Correct. You are right. I understood that one from the start.

Mr Pollock: I am an out-of-town member, and of course when you are an out-of-town member you are allowed to rent an apartment here in Toronto. When you were talking about conservation, I wondered if there are any studies in regard to—for instance, I pay a flat rate, which includes the apartment, the hydro, the water and the heat. Are there any situations where you rent the apartment and you pay your own hydro, water and heat, and if there are, how does that compare with the person who pays the flat rate? I am sure if you had to pay for it yourself there would be quite a reduction. That is what I am getting at.

Dr Haites: There have been studies of that sort. I am going a bit from memory here, but I think the experience shows that you do, at least initially, get a reduction. Where you convert from a situation where the energy costs are included in the rent to a situation where you have individual metering and hence individual billing, you do get an initial reduction, but then some of that tends to get lost because people turn up the thermostat, or they get accustomed to paying so much for the hydro and a little bit more does not matter, etc. So it tends to erode a little bit after a while.

Mr Pollock: But at the start, they are quite conscious of it.

Dr Haites: Yes.

Mr Brown: I am interested in this question of incentives and disincentives, because we have actually seen that. I do not think it was government-driven, but we saw the so-called oil crisis of the 1970s and how that changes what people think and what we should do dramatically. I represent a community that happens to mine uranium, and one of the reasons it is one of the most overbuilt places in Ontario right now is the fact that because of oil prices they suspected uranium would be a commodity that would be in great demand. The prices more or less

collapsed and we have got a nice infrastructure with unfortunately not quite as much to do as we would like. But given the fact that that actually did occur, the disincentive of supply problems, of price problems, what kind of savings does that tell us we can get, or does it tell us what we can get?

Dr Haites: I am not sure that it has been analysed in quite that way, but let me try to get at it in a slightly different way. Let's go back to automobiles. Historically, from the 1960s, and perhaps even earlier, through to about 1980, the gasoline cost of driving 100 kilometres was between \$10 and \$12 in terms of 1989 dollars. Since the early 1980s, that has fallen to between \$5 and \$6, almost entirely due to the improved efficiency of the automobiles, so just the gasoline cost has fallen in half over the past decade.

It obviously has become much less costly to drive, and I think we are seeing people driving more. We have certainly seen the changes in advertising for vehicles. Now it is how quickly you can get to the legal limit and the performance of the cars. It has probably been five years since you have ever seen the fuel efficiency on a television ad.

If we look at the analysis that has been done in terms of the response in the demand for gasoline to the price increases in the 1970s and early 1980s, it suggests what economists call a price elasticity of minus 0.8. In other words, for every 100 per cent increase in the price, you get about an 80 per cent reduction in the demand.

If we were to use pricing as a way of achieving that target reduction of carbon dioxide emissions for automobile driving, we first have to see what the demand would be in 2005, and it is roughly about 40 per cent higher in a base case than today. So to get that down to 80 per cent of what it was in 1988, you need roughly a 50 to 60 per cent cut from what the demand would be in 2005. If you apply the price elasticity to that, it suggests that you need to increase gasoline prices by roughly 100 per cent in order to get that saving through gasoline prices, so you would need a 50 cent a litre tax in today's terms and that would move you back to the historic cost of driving.

Mr Brown: That is very attractive.

Dr Haites: Yes, but I think it suggests that if you want to do it through prices, the price changes are going to have to be large. I think that is the key.

Mr Brown: It also creates another difficulty when you use prices or even regulations to cause that to happen. That creates problems in other parts of the world, even other parts of this country where they are producers of that particular product. They feel they are being artificially constrained and there is more supply in the market; you have changed the law of supply and demand quite radically. I think we will not maybe just think of that one.

Mr McGuigan: Assuming we follow that route, and we are assured that the technology is out there to reduce the fuel costs or the fuel use on a mile or kilometre basis to cut it in half, do you really make much of a gain to put twice as many cars on the road, because then it becomes practical for each person in the household to have a lightweight car? In many instances it could be a cheaper car. Very low costs per mile really do not make much gain.

Dr Haites: I think the dynamics that you are getting at are perhaps even more complex yet. There has been considerable debate as to whether the improvements in vehicle efficiency that we have had over the past decade have been due just to the

regulations or were due both to regulations and price or just due to the price changes.

I think you probably have to ascribe some role to both the price changes and to the regulations. Certainly we are currently seeing that with low gasoline prices the American manufacturers are not meeting their targets, but they have persuaded Congress to soften the targets, to postpone the fines and so forth. So I think you can probably not get the higher efficiency standards just through regulation. I think you have to have a price incentive to back that up. That means that the cost of driving starts falling in real terms even though you have raised the taxes, and you may have to raise the taxes or you may have to put taxes on vehicle purchases if you actually want to keep the number of vehicles down.

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Mr McGuigan: I guess my point was that if you are really going to attack this thing, you have to go beyond prices and past regulations and say, "Thou shalt not drive," or "Thou shalt ride the train," if you are really going to make an impact on this thing.

Dr Haites: I guess that comes down to a philosophical issue of how well people will obey those kinds of commands. My feeling is that if you say to people, "If you live within three blocks of the corner store, you can't drive to the corner store," that may be hard to enforce.

Mr McGuigan: I certainly realize that, but if you listen to some of the presenters we have had here who were talking about the end of life on the planet, if you believe them—I do not think they are talking through their hats—they talk about computer models. It is easy to dismiss computer models, but some 20 years ago these computers put a man on the moon, and what is more remarkable, brought him back again. That was computer technology of 20 years ago. Those same updated computers are bringing to our attention the threat to life as we have known it on this planet. If you just project this thing forward, you sort of realize that price alone is not going to make the changes.

Dr Haites: I would agree that price alone is not. I would agree it is a problem we have to take very seriously. The measures we are going to take, be they price measures or regulations are going to have to be quite serious. Because of that, I think your choices as legislators are going to be difficult and you are going to want to balance them in ways that you think will be effective and acceptable.

Mr Ruprecht: I am sitting in for Mr Callahan. When I walked in here, Mr Kerrio said that I should not ask a question about dinosaurs. I was assuming that was an in-house joke, right?

Can I be permitted to ask a question that is not similar but that may be a bit different; that is, do you know, or do we know, or does someone know, the relationship between the ozone layer and the greenhouse effect? I would like your synopsis on that.

Dr Haites: I am not a climatologist, but I will give you my lay understanding of it.

Mr Ruprecht: A short synopsis.

Dr Haites: The ozone layer in the stratosphere helps to block ultraviolet light coming from the sun. To the extent that the ozone layer is depleted, more sunshine comes in. When it

hits the earth, the heat is absorbed and radiated back in the infrared spectrum. Part of the infrared radiation gets trapped in the lower atmosphere and that is what is known as the greenhouse effect. To the extent that the stratospheric ozone layer is depleted, more heat comes in, more infrared radiation is radiated from the earth and part of that gets trapped.

Mr Ruprecht: So there is a direct relationship.

The Chair: Mr Ruprecht, during the course of our hearings we have had expertise in crossover areas, all of which are involved in discussing and analysing the effects and impacts of the greenhouse effect and its causes. On many occasions, we have put people with areas of expertise on the spot because the questions relate to a different area of expertise. You are not the first to have done that. We will have some scientific clarification following Dr Haite's presentation.

Mrs Grier: We could make Hansard available to Mr Ruprecht, presumably, could we?

The Chair: I think that would be very useful.

Mr Ruprecht: I appreciate that. My follow-up question will be this: I have read that there might be a time span of six years by the time the gases that are released in the lower atmosphere travel towards the upper atmosphere to affect the ozone layer. If it takes six years, and in that case, of course, the ozone layer will be depleted to a much greater extent than it is today, would you then not recommend, as you first recommended today, that we might make some improvements, small steps, in a number or in a range or in a host of items in terms of lowering or making improvements towards the efficient use of energy?

Having said that about the six years and that we will be in a crisis situation because of the depletion of the ozone layer, which in turn, as you said earlier, will affect the greenhouse effect and global warming consequently, would it then not be your opinion, thinking of this reasonable idea that there is a crisis now, that your recommendation should be or must be consequently much more stringent and therefore the urgency with which you make these recommendations should be here?

Dr Haite's: Two points: The contaminants that affect the ozone in the stratosphere are the chlorofluorocarbons or CFCs. They are already governed by an international protocol to phase out production. Both Canada and Ontario have announced publicly a commitment to phase them out, except for a very small percentage of essential uses, by the end of the 1990s. So that problem is being addressed provincially, nationally and internationally—internationally not as effectively as in Canada.

With respect to the urgency of other measures to deal with the greenhouse effect, I think yes, we should start to do the things that we can do, because the longer we wait before we start to do anything, the worse the problem becomes that we have to correct.

The Chair: Dr Haite's, we appreciate that you have been able to join us today. This is the first presentation where there has been an economic input into our discussions, and that is certainly an area that we will be pursuing laterally as we move through our process. We may definitely want to call on you again for further input, particularly after we have all gone through these massive reports. I know many of the members of the committee will be interested in further discussions in this area. Thanks for being with us.

I would now like to call on Dr Danny Harvey, who is an associate from the Royal Society of Canada, to assist us with

the clarification of some information that was put before the committee earlier in the week and that has caused perhaps some confusion.

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Dr Harvey: Is the screen handy? I have been taking notes of the questions and concerns that you have been mentioning. So in a smorgasbord manner, I want to just make some comments on the very diverse concerns and areas that need clarification.

Mrs Grier: Can I just ask a question? I did not anticipate it going this afternoon, but I took it from your earlier remarks that perhaps that was your intent.

The Chair: No. I think we have a consensus of the committee that we will continue. I think this portion will not take a terribly long time and we will be able to move into the steps, so that we should be able to finish by 12 noon or 12:15.

I should say to the committee that some of the presentation Dr Harvey is going to be working on now relates to exactly the problem of the interchange of expertise and involvement. We have been putting questions to biologists on atmospheric chemistry, and that kind of overlap is very difficult.

Dr Harvey: I want to clarify some issues, in no particular order. One of the questions that arose during the week of presentations was, what is the lifetime of carbon dioxide in the atmosphere? In response to that question, one of the speakers said that the lifetime was three to four years. This raises the question, if carbon dioxide comes out in three to four years, why are we even concerned about it? Why is it a long-term problem?

The three to four years comes by considering the amount of carbon in the atmosphere, which is 750 billion tonnes, and dividing that by the amount flowing into the atmosphere every year or the amount flowing out. The two are almost in balance. So if you take a look at the flows in and out, there is about 100 being taken out every year by photosynthesis and there is about another 100 or so flowing into the oceans. So you take the 700, divide it by 200, and you have about a three-to-four-year turnover time of carbon in the atmosphere.

Looking at it another way, a given molecule of carbon dioxide in the atmosphere, on average, lasts about three to four years. But we have been saying that the perturbation that we are creating, the fossil-fuel carbon, lasts 100 years. How do you reconcile that 100-year figure with what you can see with your own eyes from this figure?

It is true that individual molecules only last three to four years, but a perturbation takes 100 years to decay, on average. Why is that? Well, if you were to put a slug of carbon dioxide into the atmosphere, it is true, it would be taken out in about three to four years, leading to an increase in the amount of carbon in the biota, in litter and in the surface layers of the ocean. But notice there are large fluxes going right back into the atmosphere. So that carbon that you put in in year one and that is taken out quickly, gets sent back to the atmosphere very quickly as well.

What we are concerned with is the net effect, the perturbation. Although the turnover is very fast, three to four years, because you are sending some of the perturbation right back to where it came from, it takes 100 years on average for the perturbations to decay. That is why we have such a problem with our fossil fuel emissions.

If you look again at this figure you will see that the amount of carbon in the ocean layer is 300 in one box and 600 in the other—that is 900—and is comparable to the amount in the atmosphere. The amount in the biota of 550 is also comparable to that in the atmosphere. There are very huge fluxes between them. At, say, a 10-year time scale, the biota, the soil carbon, the atmosphere and the surface layers, because of this rapid exchange and because they are all roughly comparable in size, effectively behave as one single box, one single reservoir of carbon which is exchanging carbon much more slowly with the deep ocean.

You will notice numbers on the order of one to 36, instead of 100 to 200. If you take the amount of carbon in this big box and divide it by the turnover rate with the deep ocean you will get something in the order of 100 years. So in fact, the two to four years that you saw and were given as the answer is in one sense correct, but so is the 100, and it is a matter of applying it to the right situation. For our purposes, where we are concerned with perturbations and policies and impacts, unfortunately it is the 100-year figure and not the three-to four-year figure that we have to deal with.

The upshot is that there is rapid turnover between some boxes, a slower turnover between different boxes, and you can get different answers depending on what you are focusing on, and if you are not careful you can apply the wrong answer to the particular question of concern. So you can see it is very easy to get confused and to lead to the wrong conclusions.

To conclude, for our purposes it is a 100-year turnover, a 100-year time scale, and that is why we are all here today. If it was only three to four years, it would not be a problem.

Another question concerns methane. If you look at a methane cycle, the turnover time for methane in the atmosphere is 10 years. The question was asked, "What is the main sink of the methane?" One of the main sinks of methane is just chemical reaction within the atmosphere. The methane combines with the hydroxyl radical, which is a hydrogen and an oxygen with an extra electron tied on: OH-. The combination of methane with that molecule is the main sink. That sink is within the atmosphere itself. So unlike carbon dioxide, where we have this disparity, the atmospheric turnover time is three to four years, but for perturbations we have to consider 100 years.

You do not have this great disparity when it comes to methane because the main sink of methane is within the atmosphere itself; it is not the deep ocean. So we can take the turnover time for methane, 10 years, and apply that to the decay time for human perturbations. So we have to compare methane, 10 years, with carbon dioxide, 100, and this tends to make the stabilization of methane inherently simpler than the problem of stabilizing atmospheric carbon dioxide.

There were some questions the other day about whether or not the buildup of ozone in the lower atmosphere is shielding us from the increase in ultraviolet radiation resulting from depletion in the upper atmosphere. The answer is, in fact, yes. What is happening in the stratosphere is that ozone is being depleted in certain layers and increasing in other layers, because ultraviolet radiation is responsible for the formation of the ozone. Then once the ozone is formed it absorbs ultraviolet radiation. So if you decrease the amount of ozone in one layer, you allow that ultraviolet radiation to penetrate farther, so it can now participate in the formation of ozone at a lower layer.

What we have seen in the northern hemisphere over the last 10 years is about a three per cent decrease in ozone. What has happened is a larger decrease in the middle stratosphere, partly offset by an increase in the lower stratosphere. We have this

so-called self-healing effect, which reduces the overall magnitude.

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With ozone decreases in the stratosphere, there is an increase in ultraviolet reaching the lower atmosphere. Even without human impacts, that in itself would tend to increase the buildup of ozone in the lower atmosphere near the surface. This is of concern to us because ozone, if you breathe it directly, is a very toxic gas. Many crops and species of forest trees are very sensitive to ozone, so we really do not want it down here. It has very negative consequences. The only consolation is that it is reducing the ultraviolet radiation.

So we have upper-level ozone depletion, tending to build up ozone in the lower atmosphere. As well, the emission of nitrogen oxides, primarily from automobiles and, to a lesser extent, from power plants is contributing to a measurable hemispheric-wide buildup of low-level ozone. Ozone is a greenhouse gas, so if you increase ozone you are going to increase the greenhouse effect. If you decrease the amount of ozone you are going to decrease the greenhouse effect.

So the decrease of stratospheric ozone is actually tending to reduce the greenhouse effect, but at the same time it is allowing more solar energy to get in. Strictly speaking, that is not part of the greenhouse effect, but it does contribute to global warming. On top of that, the buildup of ground-level ozone is enhancing the greenhouse effect.

There was a question just earlier about some of the connections between ozone and the greenhouse effect. This is one, but there are many other connections. It is well known that the greenhouse effect tends to warm the surface and warm the lower atmosphere where we live and where the weather patterns occur. It is less well known that this same greenhouse effect tends to cool the stratosphere. So we have cooling of the stratosphere at the same time that we have warming of the lower atmosphere. Based on our current understanding of what is causing the Antarctic ozone hole and possibly an incipient Arctic ozone hole, cooling of the stratosphere is going to worsen the depletion of stratosphere ozone which, in turn, will worsen the buildup of low-level ozone.

We have the possibility of a feedback here, one amplifying the other, which amplifies the initial one, and so on, feeding upon itself. Also, the depletion of stratospheric ozone, to the extent that it does increase low-level ozone and increase ultraviolet radiation, is going to damage forests. That is going to reduce their rate of photosynthesis. That could then cause additional flows of carbon dioxide into the atmosphere, which is going to further amplify the low-level warming and the stratospheric cooling, so there is the possibility of a whole bunch of positive feedbacks. This is why the science is so uncertain and why there is a large uncertainty as to what the ultimate effects are going to be.

I want to reinforce the comments made by Ralph Torrie yesterday, that based on the warming that has occurred so far—that half degree over the last century—we do not know if we are on a track that is leading us to two degrees or four degrees or even six. I want to emphasize that the reason scientists and climatologists are concerned about the greenhouse effect is not because of the warming that has occurred so far. It is because of what the models are telling us will happen if we continue along the present path.

Phil Jones is quite right in saying that the instrumental record, that half-degree warming so far, does not provide confir-

mation of the models. It could be pure coincidence as far as the observational record is concerned.

Another issue that has arisen a number of times is the whole question of changes in variability as the means change. There is a perception publicly that the climate is becoming more variable over the last decade. My understanding of this, and I had it confirmed by Phil during lunch, is that the record does not indicate a change in variability. There have been extremes in the 1970s and in the 1960s, variations about the decade just as large as what we are experiencing now.

Very simple-minded reasoning, as well as results obtained from the climate models, suggest that as the climate warms, temperature variability should in fact decrease and storminess in midlatitudes should decrease. The reason for that is we have an equator which is warmer than the polar region. All the models agree that with warming, the poles are going to warm up more than the equatorial regions. So what we are going to do is decrease the temperature difference between the equator and the poles because the poles will warm up more. It is temperature differences which drive the winds which provide the energy for midlatitude storms. So if the temperature gradient decreases, overall temperature variability and storminess should decrease.

On the other hand, with warming you also get an intensification of the hydrologic cycle, which is driven by evaporation from the oceans and with the oceans warmer in absolute terms there will be more evaporation. That means there has to be more precipitation. What goes up has to come down. We expect the variability of rainfall and the differences between wet areas and dry areas, wet years and dry years should increase, so that it is a multifaceted question.

Temperature variability may go down. Precipitation variability may go up. Storminess in midlatitudes should go down, but in the tropics it is a different dynamic altogether. Tropical cyclones are driven not by horizontal differences in temperature, but are highly dependent on the absolute temperature of the oceans. There is a critical threshold of about 27 degrees for the initiation of tropical cyclones. So with the oceans warming, with more of the oceans above this threshold, the frequency and ferocity of tropical cyclones should increase at the same time the midlatitude storm disturbances are becoming less intense.

That is, I guess, all I have to say on the science questions that have arisen during the last week. I would like to make just a few comments on this whole question of pricing of gasoline. These are my own personal opinions. I do not have too much in the way of facts to back it up and what I have is mostly anecdotal, but it seems to me that if you are going to attack the question of automobile use, you need a co-ordinated package and increasing prices alone is kind of like a sledgehammer approach, which is necessary, but if it is done alone, it is not going to accomplish the goal.

I think what we need to do is increase prices gradually to avoid economic hardship and dislocation because there are social equity issues that have to be taken into account as well. We need to gradually but consistently increase prices at the same time that we are mandating higher standards for fuel economy so that the rational consumer can compensate for the price increase by simply buying progressively more efficient cars. What really is important is the price to drive 100 kilometres; it is not the price per litre. If you increase the efficiency faster than you are increasing the price, the cost to go 100 kilometres can actually be falling.

There are concerns, though, about poorer segments of society that cannot afford to buy the more efficient cars, who have to keep their dinosaurs running as long as they possibly can. So I think the third element we need is a system of—

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Mr Brown: There you go, Tony.

The Chair: There are those dinosaurs, again.

Dr Harvey: They are everywhere. I think a third package is gas-guzzler surcharges combined with rebates on vehicles that are more efficient than the moving average to make it easier for poorer members of society to get out of this bind of being stuck with inefficient vehicles. If we do this over a 10-year period with lots of warning in advance, people could buy more efficient cars in anticipation of the certainty that we are going to raise prices, if they are convinced that this is going to be the policy. I think we can do it in a way that will be mutually reinforcing and that will avoid dislocation and hardship, particularly to those who can least afford it, and achieve the desired objective.

I would also like to make the purely hypothetical suggestion that if the industrialized countries, the major consumers of oil, increase prices by 20 per cent to 40 per cent and we increase the efficiency of our vehicles, we are going to keep the lid on global demand and in the long run, by biting the bullet now and allowing prices to increase a modest amount now, we may be preventing much larger price increases later on.

We have seen how sensitive the price of oil is to imbalances in the global supply and demand. The Organization of Petroleum Exporting Countries blackmailed us into \$40-per-barrel oil in the late 1970s. A modest decrease in global demand, causing just a minor blip in the CO₂ emissions, caused that price to plummet to as low as \$12 a barrel. It is now on the way back up.

I think now is an appropriate time to put the lid on growing demand to keep long-term prices down. In the end, everybody will be better off if we can have the courage to raise prices now, because it will keep the world price lower and we will be driving cars with twice the fuel efficiency. Whatever happens to the global market later, we are going to be better off if our average car is getting 50 miles per gallon instead of 25.

That is all I have to say. If there are questions, I would be happy to entertain them.

The Chair: I would like to keep the question session fairly short so that we can move into our in-camera session relating to our initial drafting of the report.

Mr Ruprecht: I appreciate your point that scientifically it is pretty uncertain as to making any predictions and you are one, of course, who very calmly explained to us that in terms of the future, we do not know. We do not know whether there are various weather patterns that have shifted. We can only tell that the increase in global warming has been less than 1 degree and so on. I find it very interesting and very calming. But what I would like to ask you really is along this continuum from zero per cent to 100 per cent of scientific certainty, looking at your specific model in terms of the poisons of carbon—what did you call them? Carbon dioxides, I suppose.

Dr Harvey: There is carbon dioxide, methane and nitrogen oxides in the ozone.

Mr Ruprecht: Okay, so all those things. Can we get a statement from you perhaps where you can give us an idea at least of the certainty models that you might have.

Dr Harvey: I will classify our state of understanding into things that we are absolutely 100 per cent sure about, things that we are confident about and things which we have no confidence in.

Mr Ruprecht: There is a difference—is there not?—between 100 per cent certainty—

Dr Harvey: Yes, there are some things about which we are 100 per cent certain.

Mr Ruprecht: —as opposed to having confidence.

Dr Harvey: That might be 90 per cent or 80 per cent.

Mr Ruprecht: That is kind of different than saying 100 per cent, is it not?

Dr Harvey: Let me first tell you the things about which we have 100 per cent confidence.

Mrs Grier: Madam Chair, with all due respect, we have been over all of this for four days. I really appreciate Mr Ruprecht's interest—

Mr Ruprecht: I appreciate that, too.

Mrs Grier: —but I think it is all there. If we have an hour now, half an hour, maybe, at the most to decide the future of this committee, unless we can—

Dr Harvey: I can reply in three minutes—one minute for each category.

The Chair: I would like to keep this part of the session short, Mr Ruprecht, so I am going to cut you off.

Dr Harvey: One thing we know for sure is that we have a greenhouse effect today and it is on the order of 34 degrees. The greenhouse effect is not a theory; it is an observed fact.

The second thing we know for sure is that if you increase the concentration of greenhouse gases, you will cause warming. Another thing we know for sure is that the concentration of these greenhouse gases is increasing and it is due to human activities; there is no doubt about that. We are pretty confident that temperature has also been increasing. We are 90 per cent sure that there has been a real increase in temperature over the last century.

Where we have less confidence is how much the climate will warm, and how fast it will warm due to a given increase in greenhouse gases. For a CO₂ doubling, we are 80 per cent to 90 per cent sure that it is going to fall somewhere between 1.5 to 4 or 5 degrees. I would say we are 60 per cent confident that it is probably going to fall between 2 and 3 degrees. But from a policy point of view, it is not so much the 50 per cent confidence of modest impact that we may or may not be able to deal with; it is the 10 per cent possibility of truly catastrophic events that we have to be concerned about.

It is analogous to standard practice in dealing with risk and uncertainty in any field. Let's take engineering and building against earthquake hazards. If you know there is a 10 per cent chance of a magnitude 8 earthquake during the lifetime of your building and a 50 per cent chance that it is not going to be any greater than magnitude 6, you would be pretty foolish to only build against magnitude 6. Standard practice is to build against the plausible high-consequence events. You might build against

8.5 or 9. On the other hand, you might not build against a magnitude 10 earthquake, but you certainly are going to be directed by things that might have a 10 per cent probability. I would say there is a good 10 per cent probability that the consequences are far greater than our best guess and we should be concerned about that.

Where we have very little confidence concerns the regional details. All we can say is that initially some people will be losers and some may be winners, but who are winners and who are losers is likely to change through time if we have open-ended change.

The Chair: We are going to move very quickly now, Mr Brown.

Mr Brown: My concern is just for some data, I think. What I am wondering is, first, we talk about the residual, which obviously comes from human activity—the residual greenhouse gases or most of them anyway. Do we get that number from just going out and getting some air and analysing it? Is that how we know how much more carbon is in the air?

Dr Harvey: There is a global network of stations measuring carbon dioxide concentration and there are slight seasonal and latitudinal variations in that concentration which serve to constrain our models of the carbon cycle, and combined with known input from fossil fuel use, so we have a very comprehensive measuring network.

Mr Brown: That is fine. What I am really wondering, though, is we also must know, at least in some kind of numbers, how much fossil fuel we burn.

Dr Harvey: Yes. We know to within 10 per cent the global emissions of fossil fuel carbon dioxide. We have great uncertainty concerning what the emissions are from land use changes, deforestation in particular.

Mr Brown: I was just looking for a net number. How does the province fare? We know we put so much in. We have no real good idea about the sinks, or do we have a good idea about the sinks?

Dr Harvey: We have an observed increase. Globally speaking, we have an observed increase and we have a pretty good estimate on fossil fuel emissions, about 5.5 billion tonnes of carbon a year and an additional one to three, perhaps even more, possibly, from deforestation. So that brings the total up to seven to nine billion tonnes going in every year. The observed increase is three to four, so the rest is going into natural sinks.

The Chair: Could I just suggest, as Mr Kerrio has asked as well, that we have Dr Harvey prepare a summary paper of what the sources and sinks are in Ontario and Canada as a working document for the committee.

Dr Harvey: That is available already from the federal Department of Energy, Mines and Resources and the Department of the Environment and the provincial Ministry of Energy.

Mr McGuigan: Not a question, but a counter, doctor, to your argument about increasing efficiency and price: It works very well with freight, because freight is very sensitive. People are not sensitive, because we come to matters of prestige, comfort, convenience; all those sorts of things override the costs. But freight is very sensitive. When you increase the efficiency of freight, most of the result is that you simply ship the product farther. You can reach into the other fellow's market. I have had a lot of experience shipping, and what determines where I meet

somebody else in a distant market is the cost of delivering it there.

The Chair: I wonder if for this session we should concentrate on the science and the scientific questions that we have to put to Dr Harvey. We will move into the policy issues later. Mr Pollock, do you have a question relating to scientific matters?

Mr Pollock: Yes, along the same lines as we were talking about yesterday. I am not sure that Dr Harvey was the person I should have been asking this of, but anyway, if you do not know this information, would you just please send it? What is the difference between internal combustion motors or engines and external combustion motors as far as putting carbon dioxide in the atmosphere is concerned?

Dr Harvey: I do not know that answer, but according to what we heard, there have been some new technical advances

involving Rankine and Stirling engines. The bottom line is if the engine is more efficient, that means it is giving more useful energy per unit of fuel energy; then there is going to be less CO₂ emission to perform a given task. So it boils down to how many litres per 100 kilometres. The fewer litres per 100 kilometres, however you accomplish that, through reduced drag of resistance or more efficient engines, the less CO₂ emission.

The Chair: We will conclude this session now and move into an in-camera session to discuss the preparation of our report. I want to thank everyone for not only their attention, but their enormous involvement and preparation for the work of the committee this week. I think it has been an extremely valuable week in bringing the issues forward that we are going to have to deal with in our next phase.

The committee continued in camera at 1143.

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Clerk: Decker, Todd

Staff:

Harvey, Dr Danny, Liaison/Research Analyst; with Royal Society of Canada

Yeager, Lewis, Research Officer, Legislative Research Service

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